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PHOTO BY ORVILLE LOGAN SNYDER

THE CHRISTMAS OF OUR DREAMS
When Nature clothes herself in white, young and old hearts are gladdened

VOLUME 59 • NUMBER 12

NEW YORK • LONDON

COUNT ON *CLEAN* COMPRESSOR SYSTEMS

USE *Texaco Regal Oil R&O.* It is your assurance that air compressors and lines will stay ideally clean — free of rust and harmful deposits. You'll find, too, that piston rings operate freely, valves stay clean and seat perfectly. Thus, efficiency runs high . . . compressors operate dependably.

Texaco Regal Oil R&O is premium quality oil especially refined from selected base stocks, then *further improved* by effective additives and extra processing.

There is a complete line of *Texaco Regal Oils R&O,* and you can be sure of getting one perfectly suited to your compressor — whatever its size or type, whatever the number of stages or pressure involved, whatever the operating conditions.

A Texaco Lubrication Engineer will gladly help you choose the *Texaco Regal Oil R&O* exactly right to assure maximum performance. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

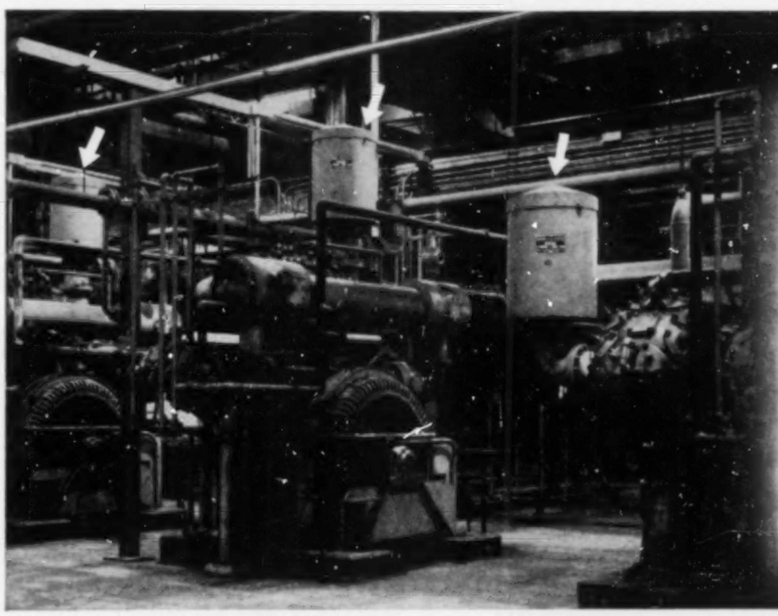
TEXACO Regal Oils R&O

FOR ALL AIR COMPRESSORS AND OPERATING CONDITIONS

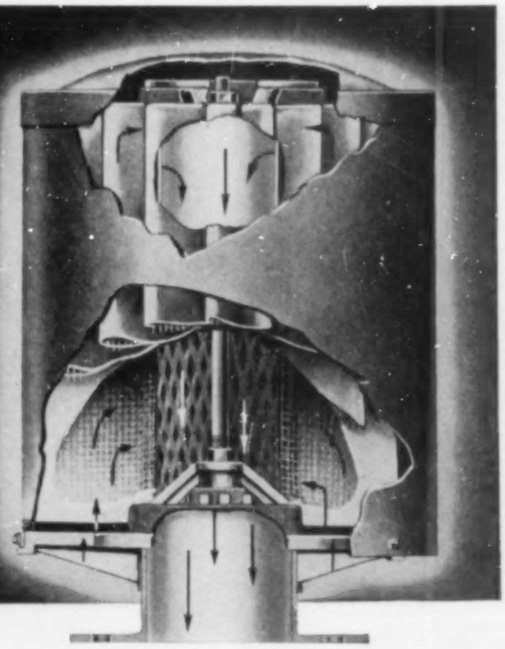
TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE or DONALD O'CONNOR, on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.

Circle 1A on reply card

STAYNEW INTAKE FILTERS



Staynew Intake Air Filters at Detroit Edison Company, Detroit, Michigan protect the vital parts of these Worthington Compressors.



MODEL D Intake Filter

KEEP COMPRESSORS YOUNG!

Your air compressing equipment demands the protection Staynew Intake Filters are designed to give. With Staynew, compressors, and internal combustion engines, blowers, motors and generators remain at peak efficiency years longer.

Staynew's "Positive Protection" keeps shutdowns and repairs at an absolute minimum. And Staynew itself requires less attention. The *dry-type* filtering medium has the ability to remove air-borne dust particles without the necessity of viscous filter aids.

Staynew Intake Filters efficiently protect vital engine parts without carefully held maintenance schedules. And where noise is a problem, Model DS Silencer Filters are available. To keep equipment young, always specify Staynew.

Write today for Staynew Catalog S.I.F.

Representatives in Principal Cities

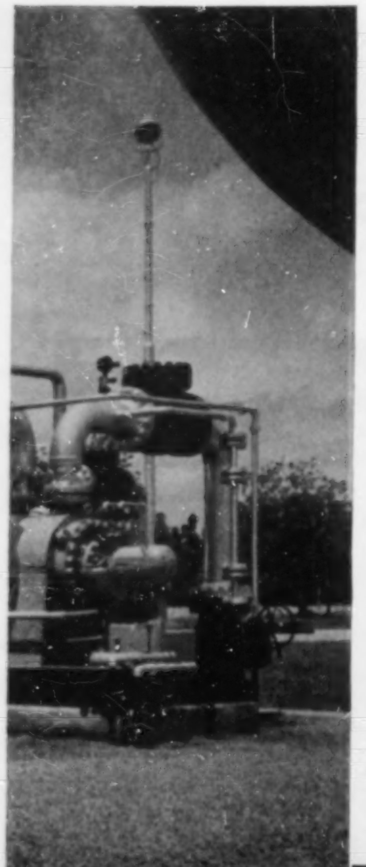
- Positive Protection
- Efficiency Actually Increases with Use
- Efficient Over a Wide Range of Loads
- Not Affected by Temperature Changes
- No Oil Carry-Over
- No Oil Blow-Out Over Free Air-Unloading Compressors

DOLLINGER
REG
PROTECTOMOTOR
U.S. PAT OFF
STAYNEW FILTERS

DOLLINGER
CORPORATION
7 Centre Pk., Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

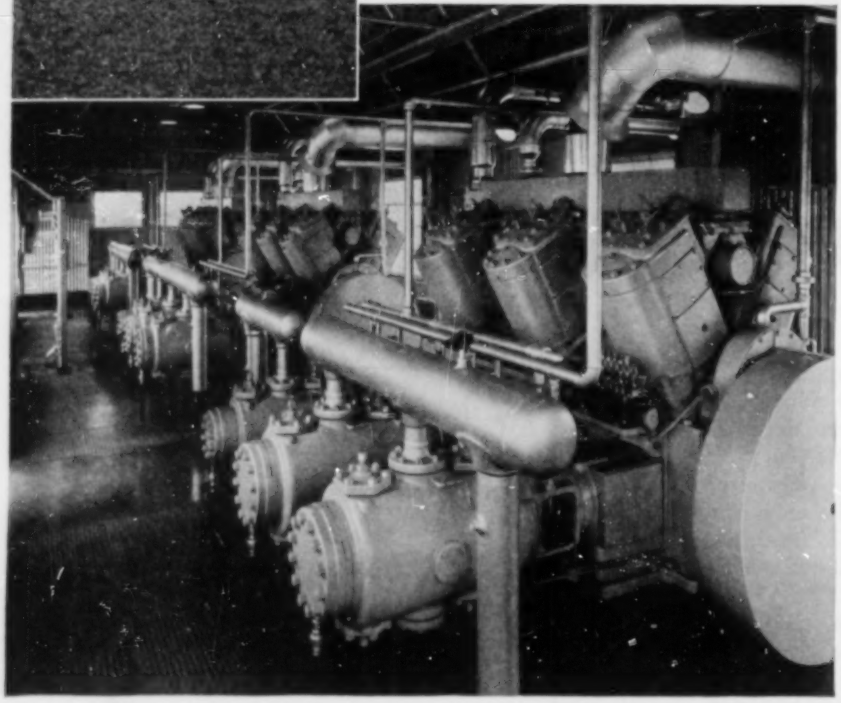
Circle 2A on reply card



New PLEDGER GASOLINE PLANT operated by SOUTHERN PRODUCTION COMPANY, INC.

"ON STREAM..."

with I-R pumps, gas-engines and compressors used on __all__ processing services



This outstanding natural gasoline plant, engineered and constructed by Stearns-Roger Manufacturing Co. processes 190 million cubic feet of natural gas per day.

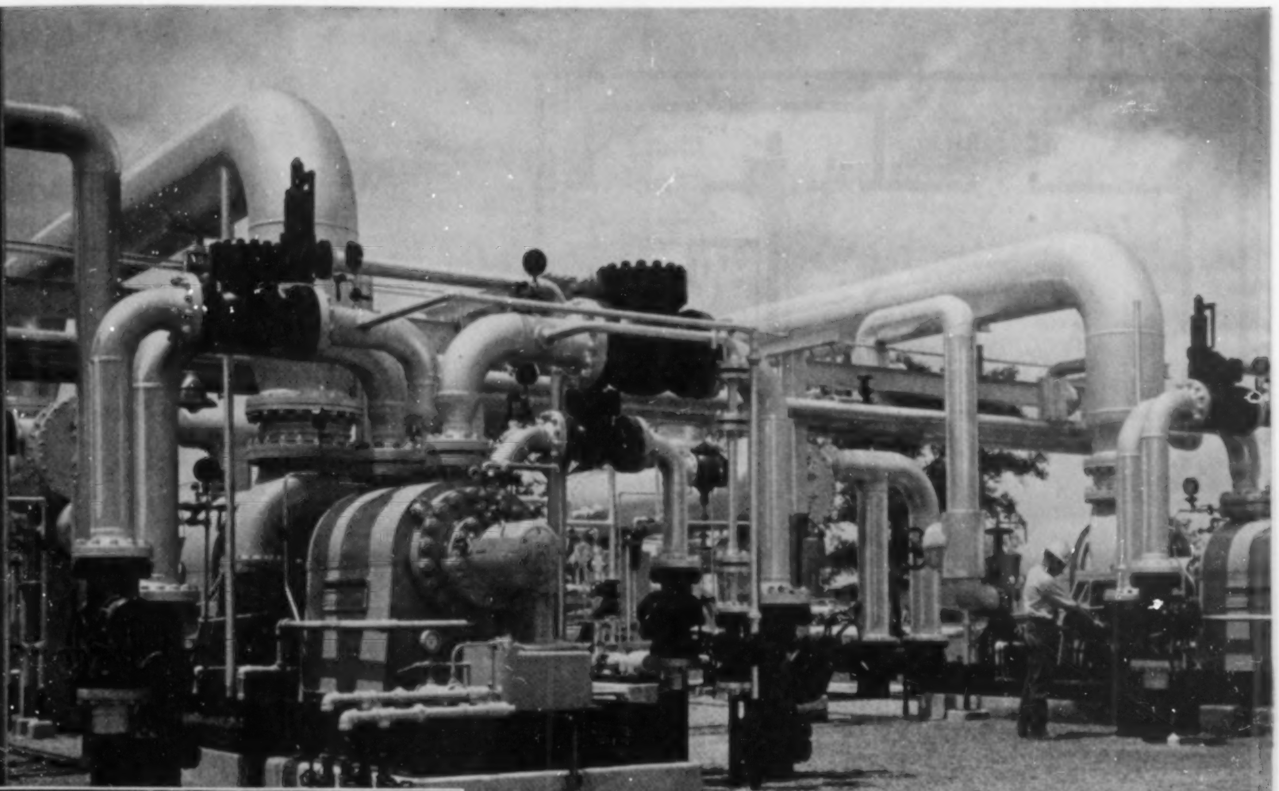
Ingersoll-Rand equipment is used throughout the processing operations at Pledger. Centrifugal pumps, ranging in size from 3 hp Motorpumps to 2000 hp double-case lean oil feed units, handle the plant's liquid products in all stages of preparation. I-R compressors, in steam, electric and gas-engine-driven types, fill the plant's compressor requirements—and I-R gas engines generate 1520 kw of auxiliary power.

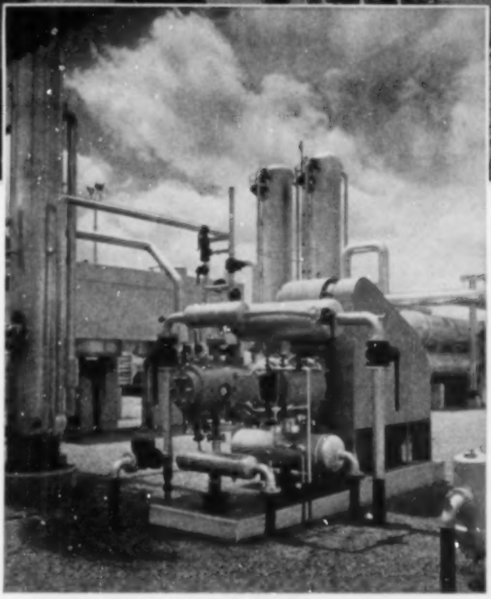
The new Pledger Gasoline Plant is another excellent example of how Ingersoll-Rand can meet the needs of the processing industry with equipment that is known the world over for dependability and fine workmanship. Our branch offices will be glad to help solve your pumping, compressing or power-generation problems. Their long experience is at your service.

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.

14-101

PUMPS • COMPRESSORS • GAS & DIESEL ENGINES • TURBO-BLOWERS • VACUUM EQUIPMENT • AIR & ELECTRIC TOOLS





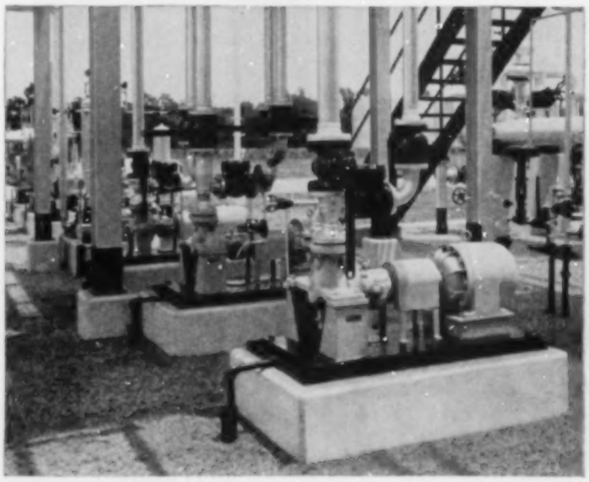
Each of these seven-stage Class CHTB I-R pumps is on lean oil service discharging to absorbers at three pressure levels: 400, 700 and 1450 PSIG. Note the neat arrangement of three sets of discharge lines.

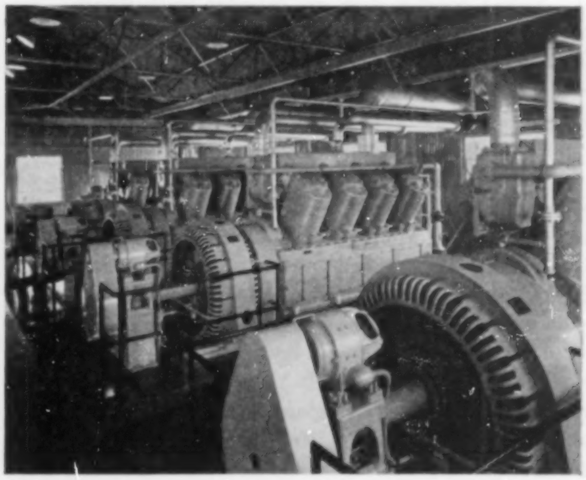
This 2-stage, motor-driven Class ES compressor handles still vapors.

Three I-R Type SVG 6-cylinder gas engine compressors handle flash gas, to demethanizer.

Ingersoll-Rand SFLA pumps, with integral mechanical shaft seal, on reflux service.

These four PSVG8 380 kw gas engine generators supply all plant electric power.





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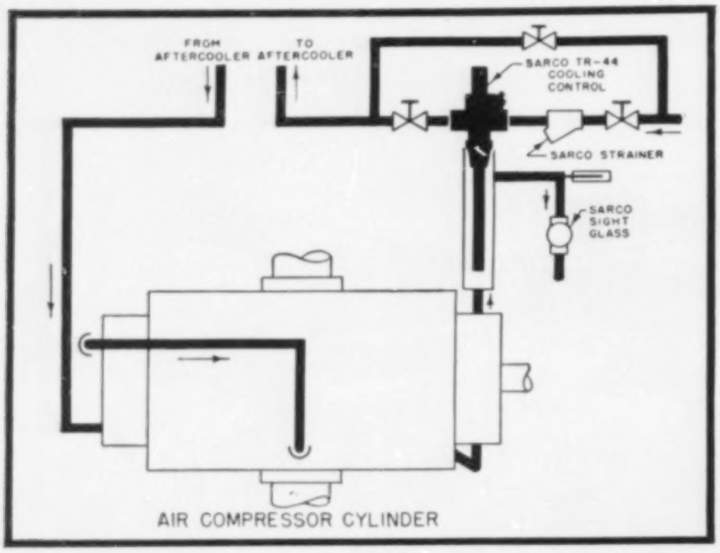
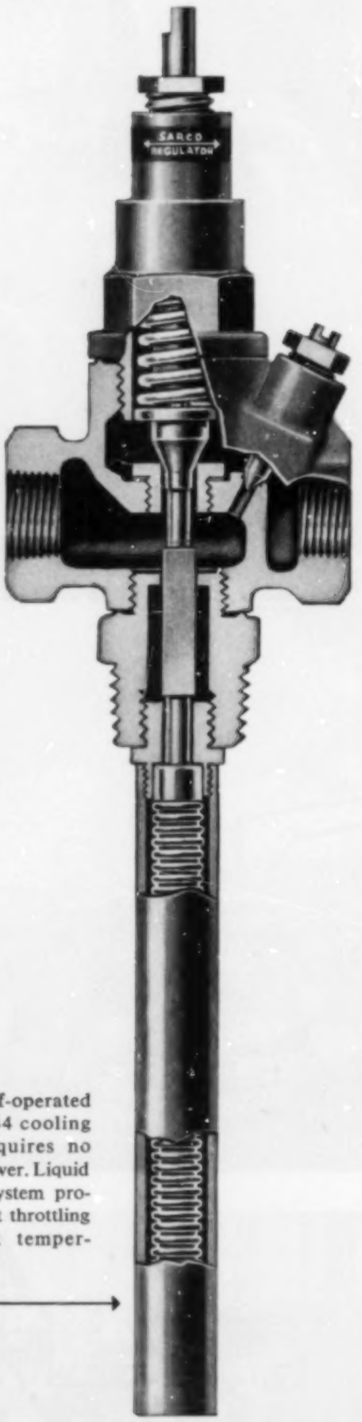


Sarco Cooling Control guards against dangerous over and under cooling.



Compressors

work better, last longer, cost less to run

with SARCO

COOLING CONTROLS

YOU have to keep your eye on a lot of things to get top efficiency from compressed air systems – and one of the most important is *cooling*.

For example, overcooling – usually a result of manual control – causes condensation on cylinder walls which destroys lubricant and increases wear. In addition, it wastes water.

If you're undercooling, you're cutting down on compressor capacity – and you're taking chances of damaging cylinders, pistons, valves and seats.

It's a lot easier – and also safer and more economical – to let dependable Sarco self-operated temperature controls take over. They insure optimum cooling effect with minimum water consumption regardless of load variation, changes in pressure and temperature of water supply. *You get protection for compressors with maximum efficiency at minimum cost.*

Send for Bulletin No. 520-A "Is Your Air Compressor Capacity Effective?" Sarco Company, Inc., Empire State Building, New York 1, N. Y. Representatives in principal cities.

Simple, self-operated Sarco TR-44 cooling control requires no auxiliary power. Liquid expansion system provides perfect throttling throughout temperature range.

SARCO

COOLING CONTROLS • DRAIN TRAPS • STRAINERS
THERMOSTATS • PRESSURE SWITCHES

Circle 4A on reply card

NEW YORK—Two of six GM Diesel-powered Ingersoll-Rand 600 c.f.m. compressors working on the New York Thruway near Tuxedo. More than 60 IR compressors were used on this "World's Greatest Highway."

CALIFORNIA—Guniting a river bank in flood control project. GM Diesel engines power Ingersoll-Rand GYRO-FLO (left) and Chicago Pneumatic rotary (right). This contractor has standardized on GM Diesel power.

TEL-AVIV, ISRAEL— Round the world you'll find GM Diesels piling up records of dependability and long life. Operating a paving breaker this Ingersoll-Rand Gyro-Flow compressor is GM Diesel-powered.

LAGUNA DE GUIJA, EL SALVADOR—GM Diesel-powered Ingersoll-Rand Gyro-Flo compressor furnishes air for the operation of a jackhammer and wagon drill near Laguna de Guija dam site, El Salvador.

Around the world they're switching to

GM

DIESEL-POWERED COMPRESSORS

Not only here but abroad, contractors report higher production with General Motors Diesel-powered rotary compressors. These modern portable rotaries—designed around the compact, quick-accelerating GM 2-cycle Diesel—deliver steadier air pressure on every job.

And with low-cost parts and round-the-clock service quickly available from the world-wide GM Diesel distributor organization, contractors keep the pressure on to meet and beat contract deadlines.

Today, GM is standard Diesel power in leading makes of compressors—in sizes down to 105 c.f.m. In air compressors, as in more than 750 models of equipment built by over 150 manufacturers . . .

It Pays to STANDARDIZE on

GM
GENERAL MOTORS
DIESEL
POWER

DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN

Single Engines...30 to 300 H.P. • Multiple Units...Up to 893 H.P.

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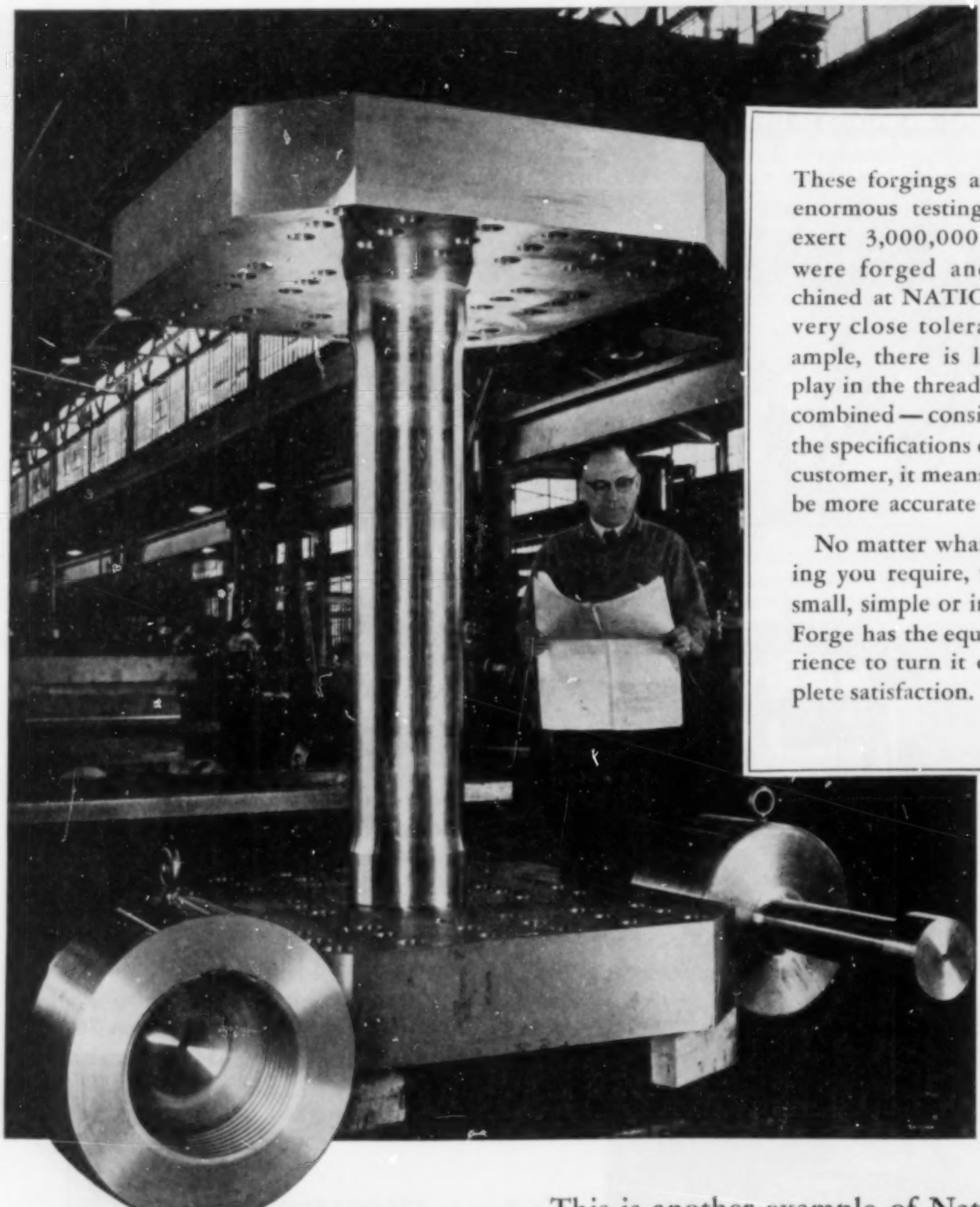
Real "PULL"

...3,000,000 Lbs. Worth



These forgings are fixtures for an enormous testing device that can exert 3,000,000 lbs. pull. They were forged and precision machined at NATIONAL FORGE to very close tolerances. As an example, there is less than .003 in. play in the threads top and bottom combined — considerably less than the specifications called for. To the customer, it means testing data will be more accurate and informative.

No matter what type of machining you require, whether large or small, simple or intricate, National Forge has the equipment and experience to turn it out to your complete satisfaction.

This is another example of National Forge's capacity for high precision machine work.

NATIONAL FORGE AND ORDNANCE COMPANY

PRODUCES BETTER STEEL FORGINGS AND MACHINE WORK

IRVINE, WARREN COUNTY,
PENNSYLVANIA

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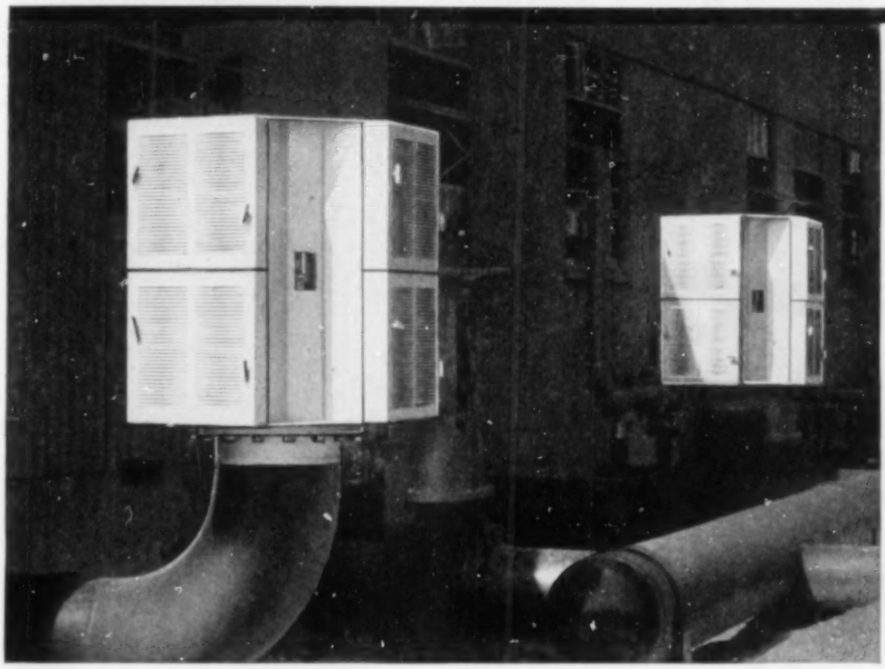
GUARD THE INTAKE and CUT YOUR OUTGO!*



***AAF "OC-H" Filters Eliminate Costly Repairs and Time Losses Due to Dust Damage**

You're actually "piping trouble" to your engines and compressors when you fail to properly filter the air at the intake. The result is always the same—always costly—major repairs accompanied by important production losses.

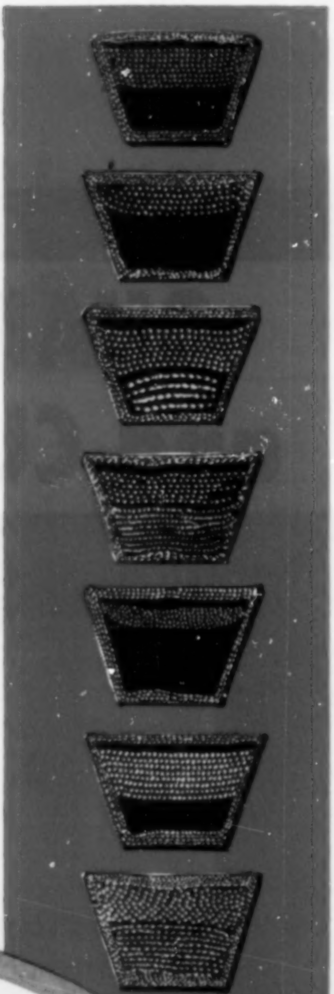
Nor does the presence of just any filter at the intake guarantee protection. If it's doing a job short of perfection, you are merely delaying your troubles. That's why AAF's Type "OC-H" Air Intake Filter is a favorite in the field. This washable unit-type filter combines high cleaning efficiency with low resistance to air flow and large dust holding capacity. Its first cost is low, and sturdy construction assures long, trouble-free operation.

Don't let "dust protection" be an afterthought in your planning. AAF's complete line of Air Intake Filters permits the selection of the most economical and efficient unit for handling your specific dust loads. Write us today for complete catalog information.

AAF **American Air Filter**
COMPANY INC.
402 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

Circle 7A on reply card

There is a difference in V-Belts— and it's Big Enough to Save You Money!



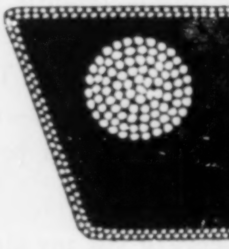
TEXROPE
V-belt
DRIVES

The secret lies in the way a belt is built. *Texrope* V-belts, with grommet construction, are completely different from seven leading competitive brands. Tests revealed some astonishing facts.

For instance, a *Texrope* grommet belt, C section, had almost 50% greater strength than the best of the other comparable belts . . . almost twice as much strength as the poorest.

Ask your A-C representative or distributor for the complete story. Have him show you what the difference in V-belts means in terms of dollars you can save.

A-4456



Texrope is an
Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

Milwaukee 1, Wisconsin

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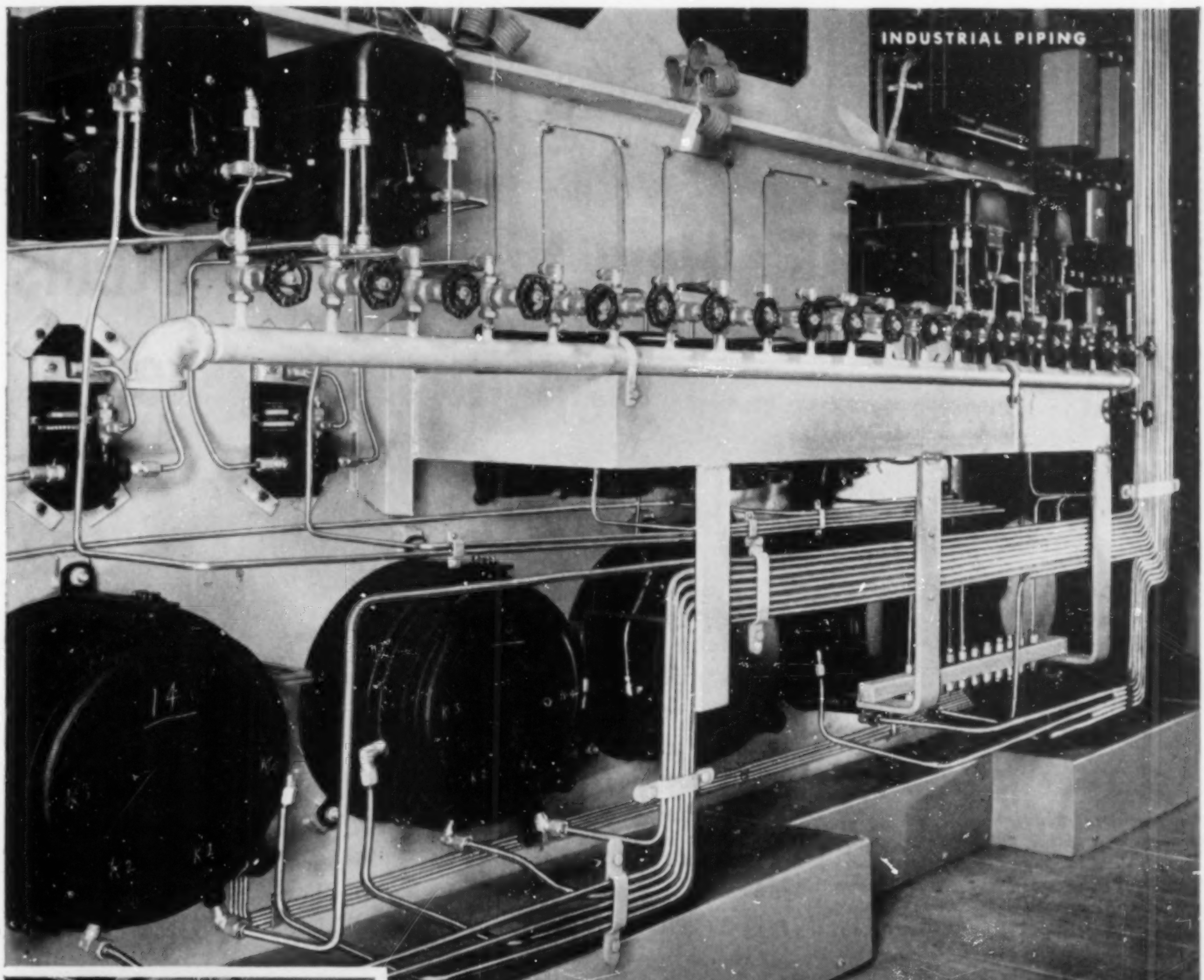
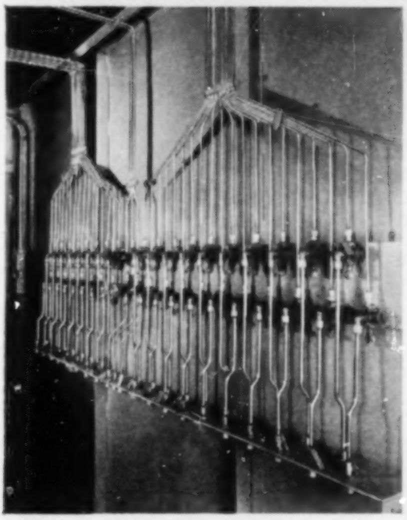


THESE AIR SIGNAL LINES in Toronto's Richard L. Hearn Power Station use copper tube in long lengths, change direction and avoid obstructions without fittings.



MOIST COMPRESSOR AIR can never form rust or scale to impede control in this installation made by Bailey Meter Co., Ltd.

Wet air can't rust this copper control piping

CONTROL would be impaired if moisture could create rust or scale in these pneumatic control lines for coal-pulverizing equipment installed by Bailey Meter Company, Limited, in Toronto's Richard L. Hearn Power Station. A number of these copper tubes convey differential pressures to the pulverizer feeder controllers, while others transmit an air signal to the pulverizers to selectively limit the rate of coal feed. Rust particles which might interfere with the satisfactory operation of the control system cannot form, and the smooth bore keeps flow resistance at a minimum.

Here, as in all copper tube systems, the long lengths, the light weight and the elimination of many fittings by bending all make important savings in installation costs. Where flare or solder-type fittings are used, there are no threads to cut, and connections stay tight.

Publication C-24 offers many additional facts on how ANACONDA Copper Tubes can help improve product quality, reduce operating and maintenance costs and avoid costly shutdowns. Write to: *The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* 5330A

call your

ANACONDA®

distributor for

Copper tubes and fittings for industrial process lines, water, heating and sanitary drainage systems; American Flexible Metal Hose and Tubing; American Vibration Eliminators.

Circle 9A on reply card

The Quarrymaster, because of its air operated treads, is highly maneuverable. It takes only a matter of a few minutes to move from one hole to the next. Shown above is a unit at the Fanwood Crushed Stone and Quarry Co., Fanwood, N. J.

How Nickel Alloy Steels help Quarrymaster cut costs

Packing its own power of two 415-cfm heavy-duty air compressors, the self-propelled Ingersoll-Rand Quarrymaster cuts costs and speeds up many heavy rock excavation jobs by being able to drill 6″ diameter holes up to 75 feet deep and space them on much greater centers than conventional drills.

The heart of the unit is a remarkable compressed air operated piston rock drill. The piston itself, the rifle bar and other vital parts are made from heat-treated nickel alloy steels engineered to meet the demands of each component.

For instance, the nickel alloy steel piston is able to withstand the continuous load of more than 200 heavy blows per minute.

In a similar way, other nickel alloy steels answer the particular needs of the other parts. As a result, this tool can drill a 6″ hole in the hardest rock at the rate of 10 feet per hour. In softer rock, it can drill up to 80 feet per hour.

Whatever the job, when you need a metal with extra qualities for dependable performance, less maintenance and fewer replacements, think of nickel alloyed steels.

Send us details of your metal problems... we'll be glad to help you with suggestions for specific applications.

The Ingersoll-Rand Carset drill bits used on the machines are carried by high strength alloy steel rods which withstand the severe shocks and stresses encountered in pit, quarry and construction work.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK 5, N. Y.

Circle 10A on reply card

Here's modern press control at its SAFEST

Yes, with the **Schrader Two-Hand Press Control** you'll find operator confidence soars—and so does production—because this easy-to-install unit can be operated only by both hands simultaneously. This means:

1 *Production hits new highs* as operators, no longer worrying about personal safety, develop a new high-speed work rhythm in short order.

2 *Production stays high,* because the effortless fingertip operation with Schrader Controls leaves operators fresh and alert, even after a full day's work.

Look over the mechanical-clutch machines in your shop. Wherever you find operators straining back and leg muscles to maintain production—tiring themselves so that they are less alert to safety precautions—*there's a real need for Schrader Pneumatic Controls.* Available for easy foot operation as well as two-hand operation as shown here, Schrader Control Sets come complete and ready for mounting on your presses.

Ask us to help you decide which of the several Schrader Control Sets will fit your needs best. Simply write us, outlining your installation—or fill out the coupon below.

Schrader

REG. U. S. PAT. OFF.

Leaders in air control since 1844

A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn 38, N. Y., Dept. W-1

I am interested in more information on ____________

Name____________ Title____________

Company____________

Address____________

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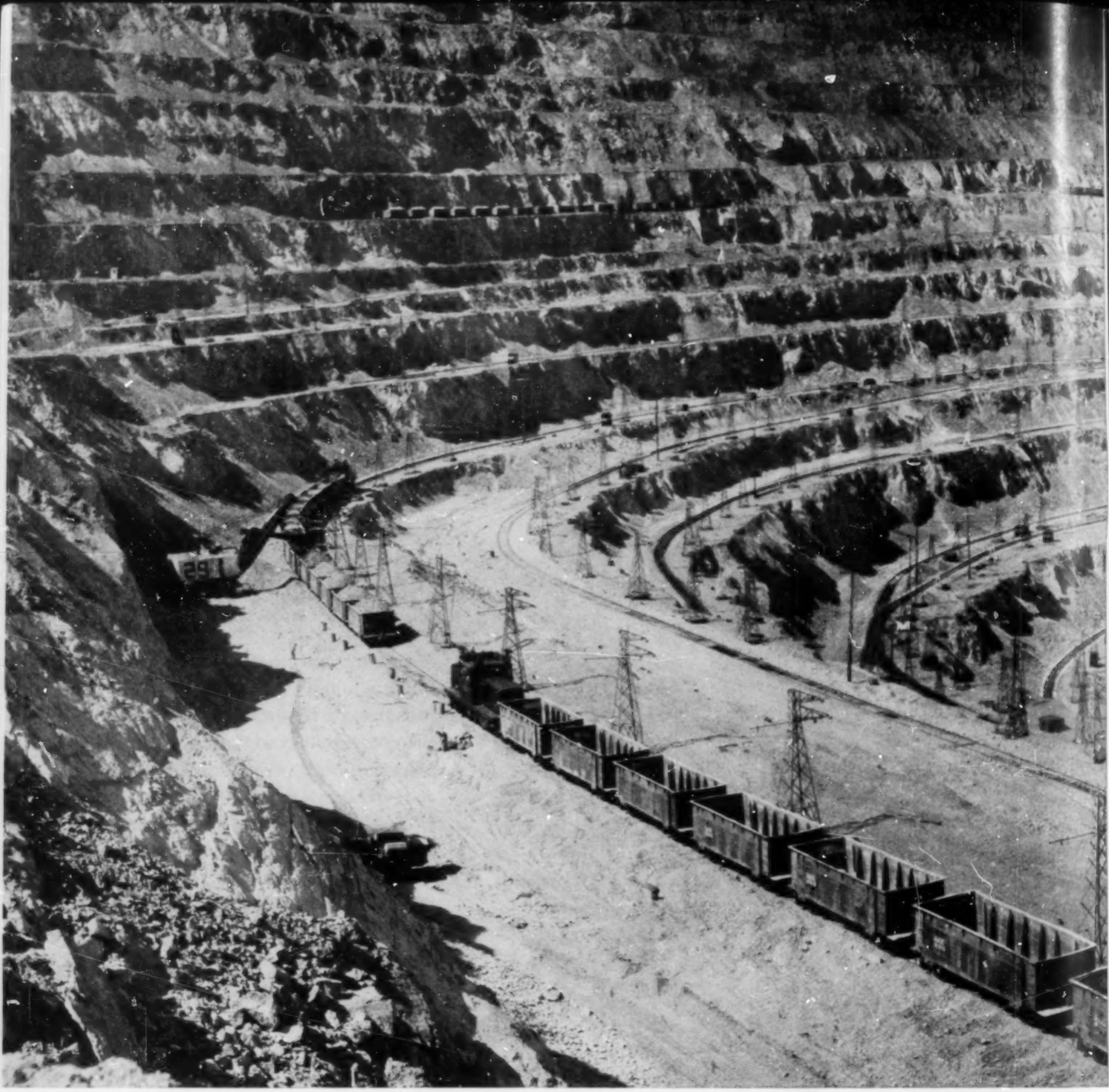


IMPOSSIBLE WITHOUT EXPLOSIVES

In 50 years of mining operations by the Utah Copper Division of Kennecott Copper Corporation, Bingham Canyon has yielded more than 694,000,000 tons of copper ore. That's a lot of ore and it called for millions of pounds of industrial explosives, skillfully used, to break the ore loose from working faces, assure efficient shovel operations, and quick transportation to crushing and washing plants.

Explosives have been Hercules' business for 40 years. Wherever industrial explosives are needed, a Hercules technical representative can assist in the selection of the right explosives and blasting supplies for the job and recommend the most efficient methods to be used.

HERCULES POWDER COMPANY
INCORPORATED
Explosives Department, 932 King Street, Wilmington 99, Del.

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Calif.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Calif.

XR54-9

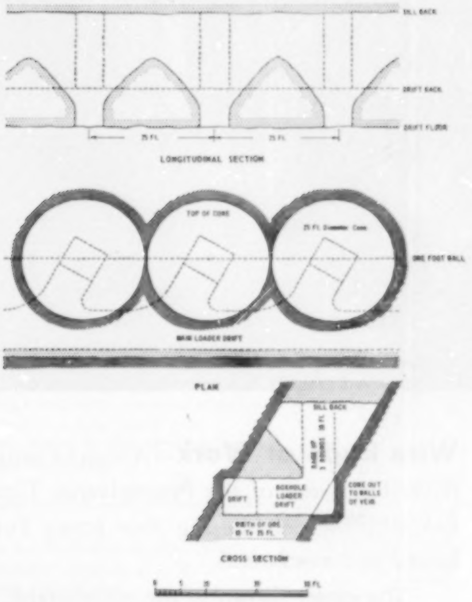
INCREASE PRODUCTION LOWER COSTS

Yes! You can increase production and lower costs by using Eimco loaders to load your production tonnage.

The advantages of being able to load larger pieces, use less powder, practically eliminate secondary blasting and absolutely eliminate expensive chutes and grizzlies, will enable your mine to get into production in a new area faster at less expense.

That's why so many mining men are traveling to see mines that have changed their systems to production loading with Eimcos.

Many different ideas for saving time and lowering costs have been developed by operators to fit their particular conditions. A sketch of one of these is at right. Eimco engineers have helped work out numerous systems, they will be glad to help you. Write Eimco for information.


SILL BACK
DRIFT BACK
DRIFT FLOOR
25 Ft.
25 Ft.
LONGITUDINAL SECTION
TOP OF CONE
25 Ft. Diameter Cone
ORE FOOT WALL
MAIN LOADER DRIFT
PLAN
SILL BACK
RAISE UP 3 ROUNDS 18 Ft.
DRIFT
BOXHOLE LOADER DRIFT
CORE OUT TO WALLS OF VEIN
WIDTH OF ORE 18 To 25 Ft.
CROSS SECTION
0
5
10
20
30 Ft.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

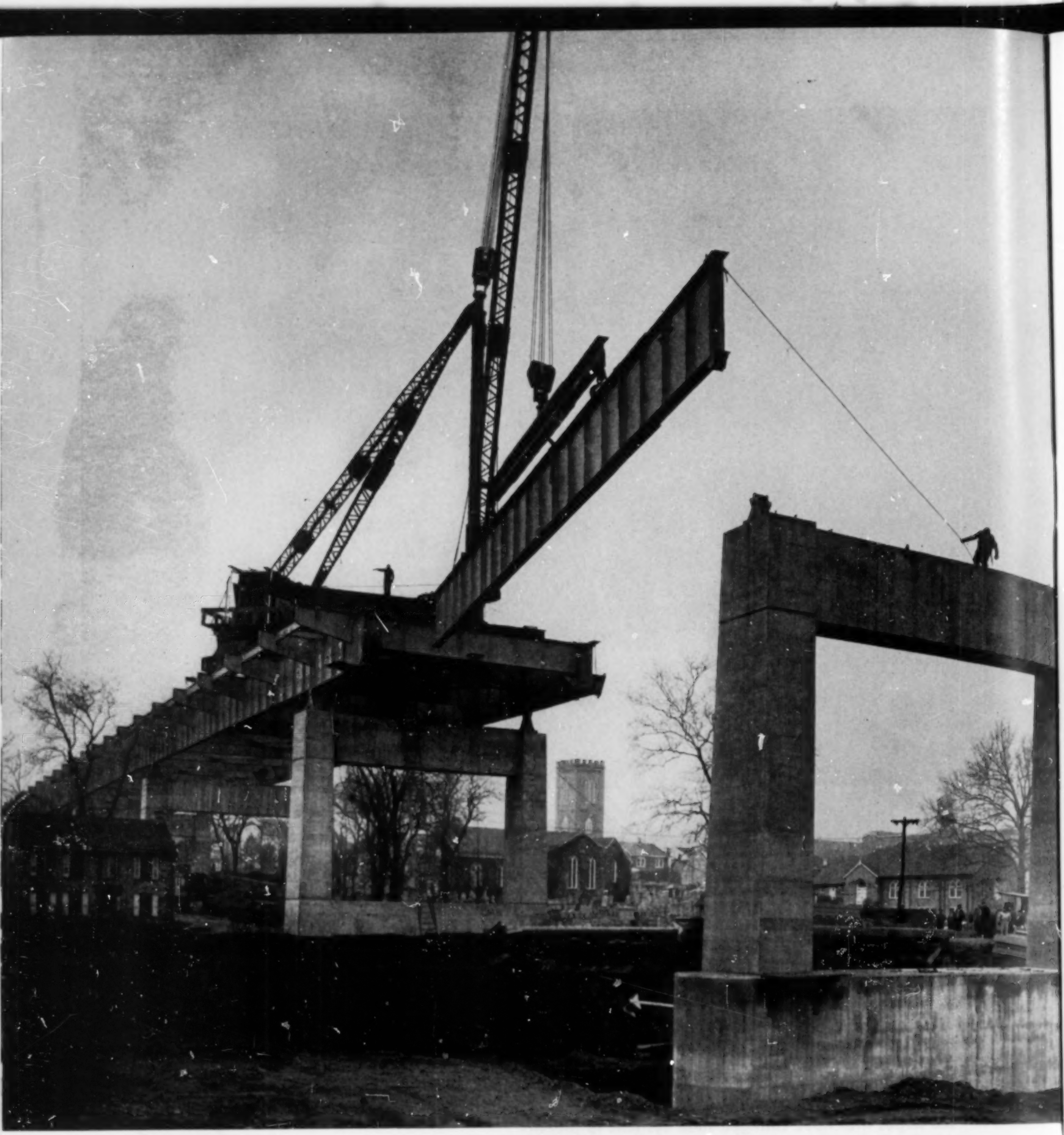
New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Texas Birmingham, Ala. Duluth, Minn. Kellogg, Ida. London, Eng. Paris, France Milan, Italy

B74

You Can't Beat An Eimco

← *Circle 12A on reply card*

Circle 13A on reply card



Wire Rope at Work—A sign of progress, a sign of the times, was this construction scene on the Delaware River Extension of the Pennsylvania Turnpike. As a means of bypassing Philadelphia traffic and providing a link with the neighboring New Jersey Turnpike, the new extension should be a boon to motorists, both eastbound and westbound.

The girder shown in the photograph, the one being lifted into place, is part of a new bridge that crosses the Schuylkill River at Bridgeport, Pa. Weighing approximately 37 tons, this structural member was handled by a big stiffleg derrick rigged with Bethlehem wire rope. Here the job called for strong Purple Strand, the rope that tames the meanest lifts—and the hefty girder proved no problem at all.

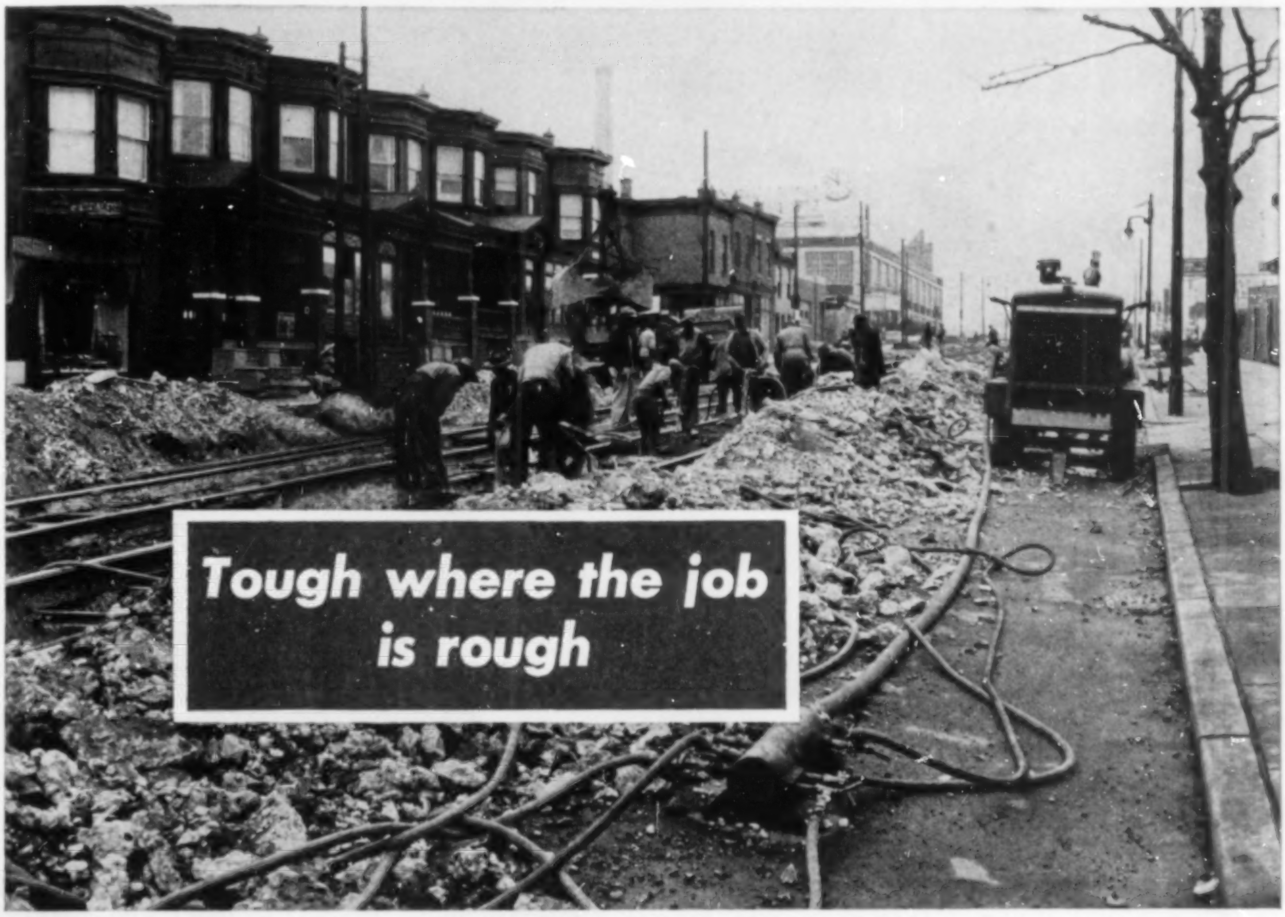
Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

CONSTRUCTION • MINING • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING

BETHLEHEM STEEL

BETHLEHEM WIRE ROPE



Compressor hose with tube and cover of NEOPRENE withstands brutal punishment in track maintenance

Pneumatic paving breakers take a terrific beating on track repair jobs—and so do the air hoses that feed them. These hoses are yanked from under heavy pieces of rubble and twisted around sharp corners of sun-baked pavement—rough service for any hose cover. And hot, oil-laden air continually threatens the hose tube. Yet here's a compressor hose that's built to stand up to all this punishment. It's made inside and out with rugged Du Pont neoprene.

THE COVER OF NEOPRENE is tough and durable ... resists abrasion, cutting and chipping throughout its long life. And, because neoprene can withstand the deteriorating effects of sunlight, heat and weathering, the fabric reinforcement receives maximum protection.

THE NEOPRENE TUBE won't go to pieces when exposed to hot lubricating oil in the air stream. No crumbled particles are carried along to clog vital tool parts. And neoprene's toughness and flexibility assure long, trouble-free service under the most adverse conditions.

DU PONT SUPPLIES neoprene to hose manufacturers who use it in their top-quality lines. Ask your supplier about all kinds of hose with tube and cover of neoprene. He'll be glad to show you how it's built for rugged service.

FREE! **THE NEOPRENE NOTEBOOK**

Each issue brings you new, unusual applications of neoprene . . . new products . . . interesting stories. Send in the coupon below to get on the mailing list.

neoprene notebook
SINCLAIR EVALUATES NEOPRENE COATINGS

NEOPRENE

The Rubber Made by Du Pont Since 1932

DU PONT
REG. U. S. PAT. OFF

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Rubber Chemicals Division CA-12
Wilmington 98, Delaware

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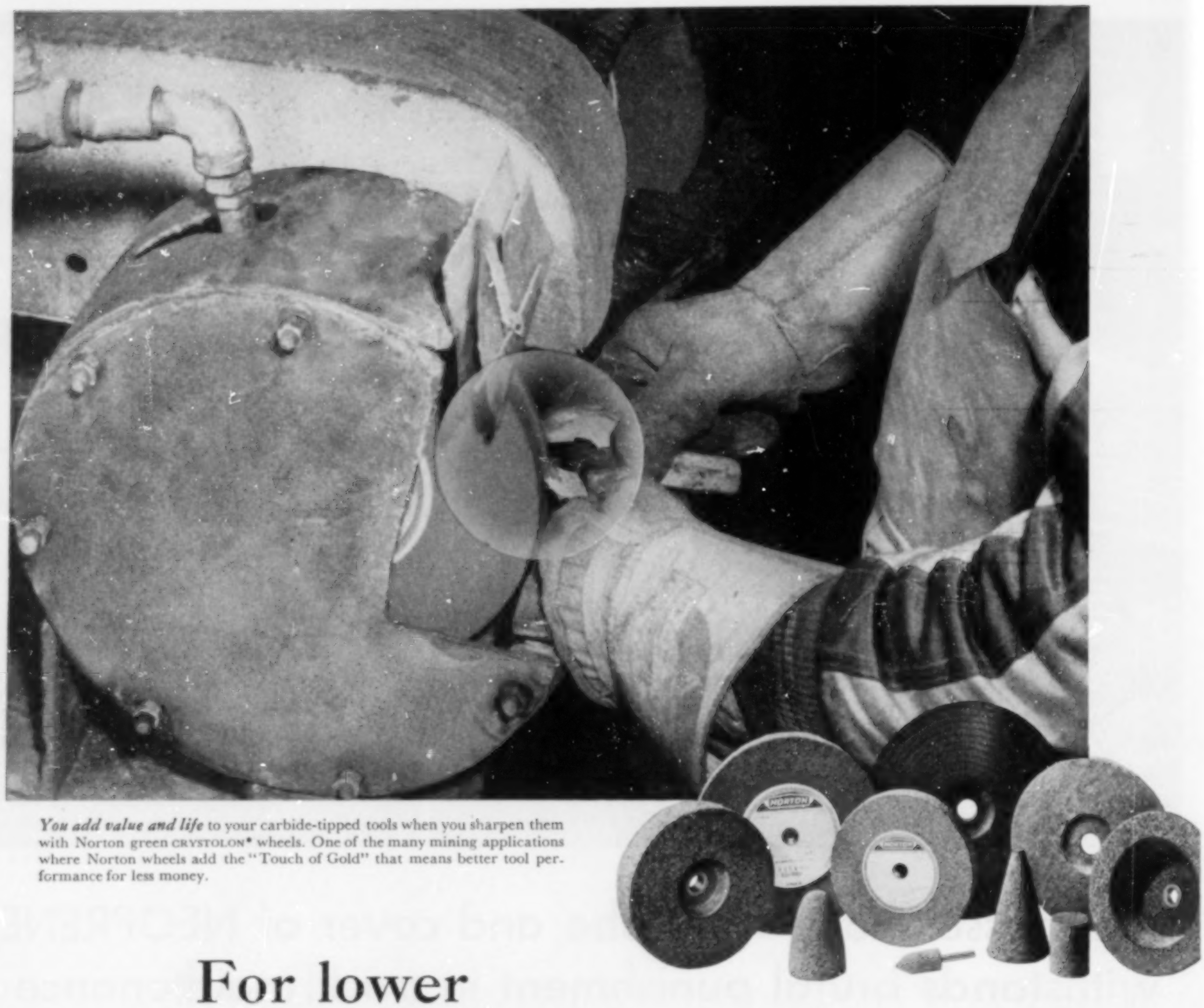

You add value and life to your carbide-tipped tools when you sharpen them with Norton green CRYSTOLON* wheels. One of the many mining applications where Norton wheels add the "Touch of Gold" that means better tool performance for less money.

For lower over-all mining costs... the "TOUCH of GOLD"

During manufacture, it took a good many grinding operations to give your mining tools and other costly equipment the keen edges, accurate dimensions and smooth finishes that assure maximum working efficiency and service life. That's why grinding is the true "Touch of Gold" that adds value obtainable in no other way.

And since you can maintain tools and other equipment in peak condition only by many additional, repeated grinding operations, why not add your own "Touch of Gold" with the brand of grinding wheels preferred by mining equipment manufacturers? . . . These are Norton wheels — and they'll save time, work and money on every grinding job you do, above or below ground.

- For your carbide tool grinding, use Norton wheels of green CRYSTOLON abrasive. With their free, cool-cutting action you get faster sharpening and tools that stay sharp longer and last longer. And the improved vitrified K-bond is so closely controlled that you can specify wheels of half-grade increments of hardness, meeting your particular needs exactly.
- For grinding high-speed steel tools, Norton ALUNDUM* wheels cut equally fast and cool. Covering a wide range of applications, they're unbeatable for grinding hard, high-tensile-strength materials.
- On gray iron, non-ferrous metals and other low-tensile-strength materials, Norton regular 37 CRYSTOLON wheels will cut your grinding time and costs.
- For many other grinding jobs, ranging from weld finishing to cutting off and notching, Norton Reinforced wheels — the BD rigid and BFR semi-flexible — are the fastest, safest, most versatile wheels made.

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CHRISTMAS SEALS
FIGHT
TUBERCULOSIS

IN THIS ISSUE

CAPE Breton Island, an important industrial and recreational section, is being linked to the Nova Scotia mainland by a rock-fill causeway of exceptional size. More than nine million tons of granite has been quarried from a neighboring height and trucked, 40 tons at a time, to the lengthening finger reaching across the Strait of Canso through water ranging to 180 feet in depth. The structure will provide facilities for handling all forms of traffic and eliminate slow ferry service. Coastwise shipping through the strait will be bypassed by a canal and lock.

•

THE most efficient air compressors and pneumatic tools cannot give best service if the distribution system is outmoded. Only when the connecting network is such as to prevent costly leakage can the full benefits of air power be realized. The story of how one firm, a structural-steel fabricator, modernized its air system and obtained highly satisfactory results in consequence is told in an article beginning on page 346.

•

BARNEGAT Light, once highly useful but now only a landmark, is being treated kindly by its new warden, the State of New Jersey, which took it over rather than let the Federal Government erase it from the skyline. Having just received a cleaning back-scratching and a gleaming coat of fresh paint, Old Barney will soon occupy the place of honor in a state park. Page 353.

•

BECAUSE it evolved from local superstitions and traditions, the celebration of Christmas varies considerably in different parts of the Christian World. Some of the principal customs are described on pages 356-57.

Compressed Air Magazine

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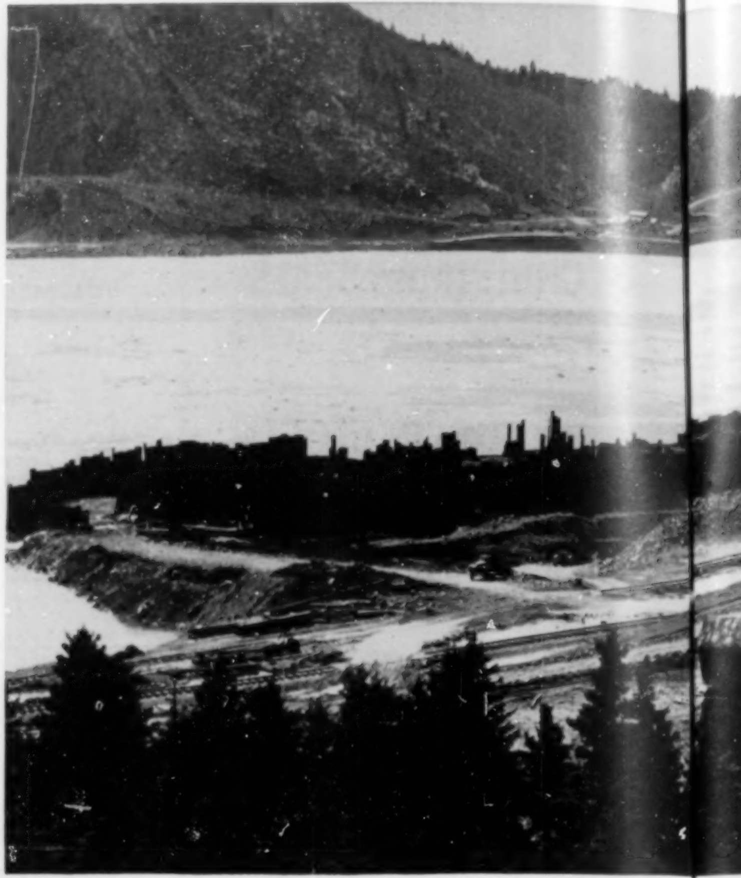
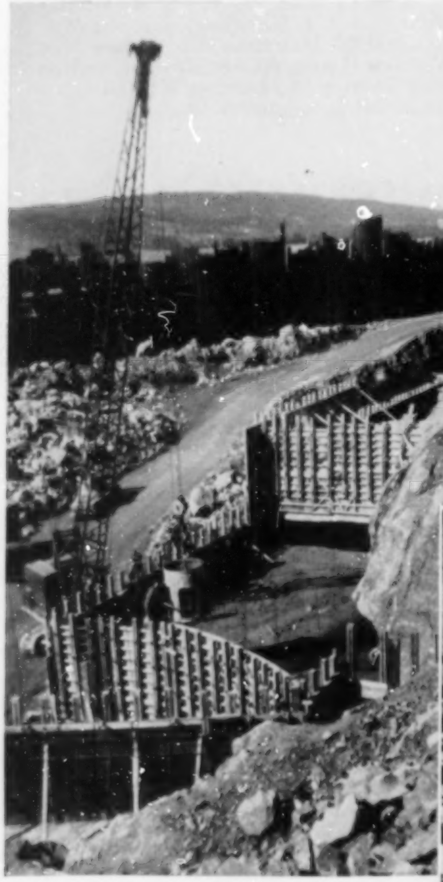
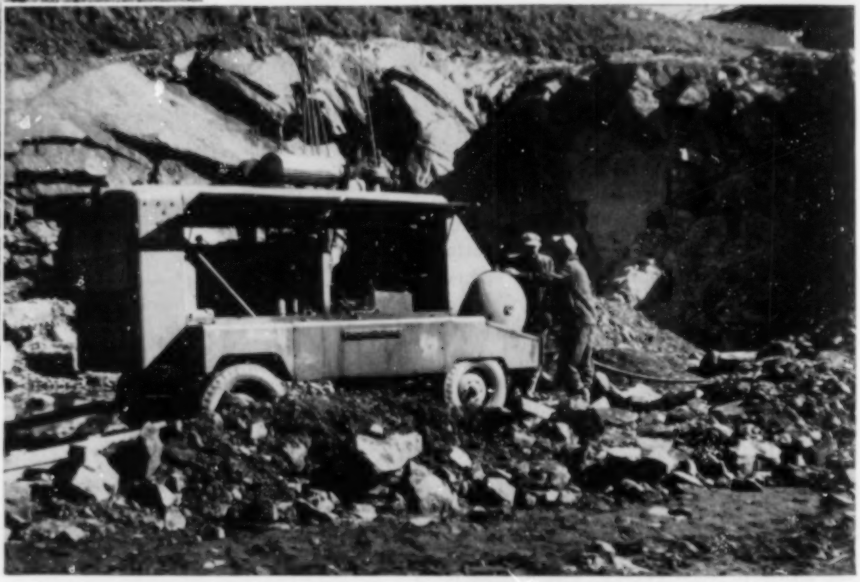
Strait of Canso Causeway is a

NINE-MILLION-TON MOVING JOB

J. P. Smallwood







CANAL CONSTRUCTION

The steel-pile and earth-rock cofferdam is seen in the background of the picture at the left. In the foreground a crane is depositing a 2-yard bucket of concrete in one of the forms for the canal wall. The view just above shows a Gyro-Flo 600-cfm compressor that supplied some of the air for drilling in the canal and lock area at the island end of the causeway.

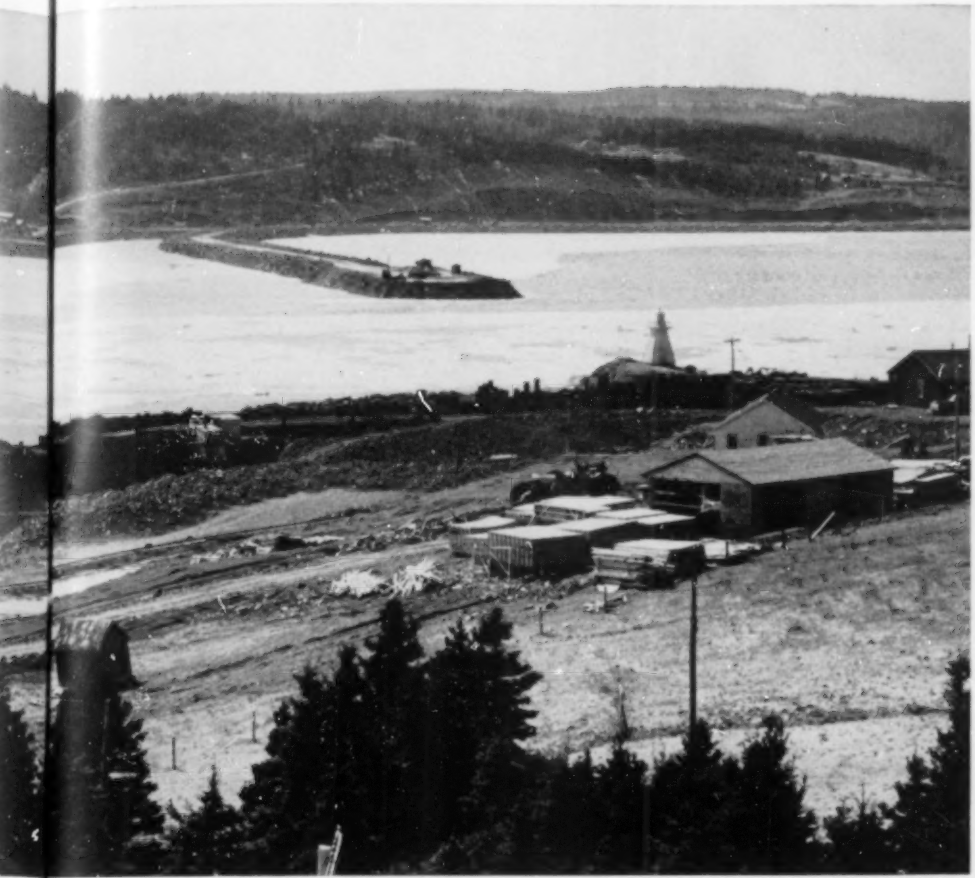
CAPE Breton Island, which appears on the map as a spur of the boot-shaped Province of Nova Scotia, is a region of contrasts. Against the quiet pastoral beauty of its Bras d'Or (Golden Arm) Lakes stand the vigorous blast furnaces, open-hearths, foundries and mines of the Dominion Steel & Coal Company among allied enterprises in the industrial city of Sydney.

Again, old meets new in a mixture of patriarchal Gaelic and modern slang in fishing villages all along the Cabot Trail, a tourist highway that rings the island. This mingling of the old and new is good for Cape Breton because both are economic factors that backed up a decision to construct the world's deepest causeway across the wide Strait of Canso. It will link the island with the mainland of Nova Scotia and is scheduled to be completed by the end of next year.

A $22,700,000 project, the rail and motor-vehicle route will tend to lower freight rates on Cape Breton's exports of steel, coal and wood products,* thus giving them a "break," competitively speaking, in the domestic market. And because most of the island's commodities are imported, the causeway is expected to bring about a higher standard of living

---

*The coal industry everywhere is hard hit in competition with oil and other more convenient fuels. Cape Breton's $40 million bituminous-coal industry, 38 percent of the country's total, employs about 9000 of its 157,000 inhabitants (one-third of the province). Its steel output is worth $50 million plus, and the gross value of its lumber products, not including pulp and paper, is approximately $1.5 million.



PHOTO, NOVA SCOTIA BUREAU OF INFORMATION

THE LENGTHENING FINGER

The causeway approaching the Cape Breton shore. Along the near water's edge, protected by a cofferdam, a canal and lock are being constructed to by-pass shipping.

by improving transportation. Furthermore, greater accessibility will also measurably increase the popularity of Cape Breton as a recreational center. About 15,000 cars carrying tourists have crossed the strait yearly by ferry to chalk up a registration of nearly 50,000 guests at the famous Cape Breton National Park. Unlike other similar meccas, the island has room for thousands more. There tourist business is big business, and when the causeway is opened to traffic it will be bigger still.

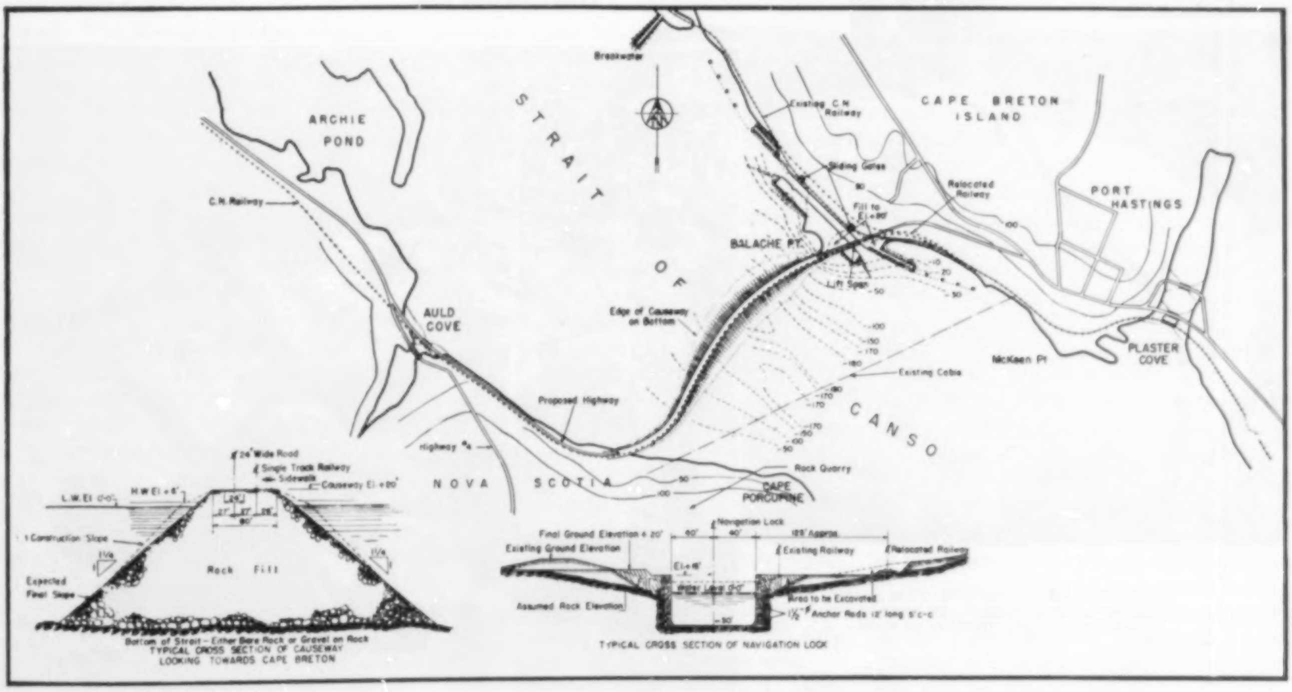
The highway has been a Nova Scotian dream for more than half a century. The first railroad connection between Cape Breton and the mainland consisted of a powerful tug pushing a large barge on which cars were chained to tracks on the deck. That service was established in 1891, and two more-modern ferries were provided later. Even so, including time lost in switching, it takes an hour to get a passenger train across the strait. In the case of cars, when long queues are waiting at the wharves, the trip sometimes takes longer.

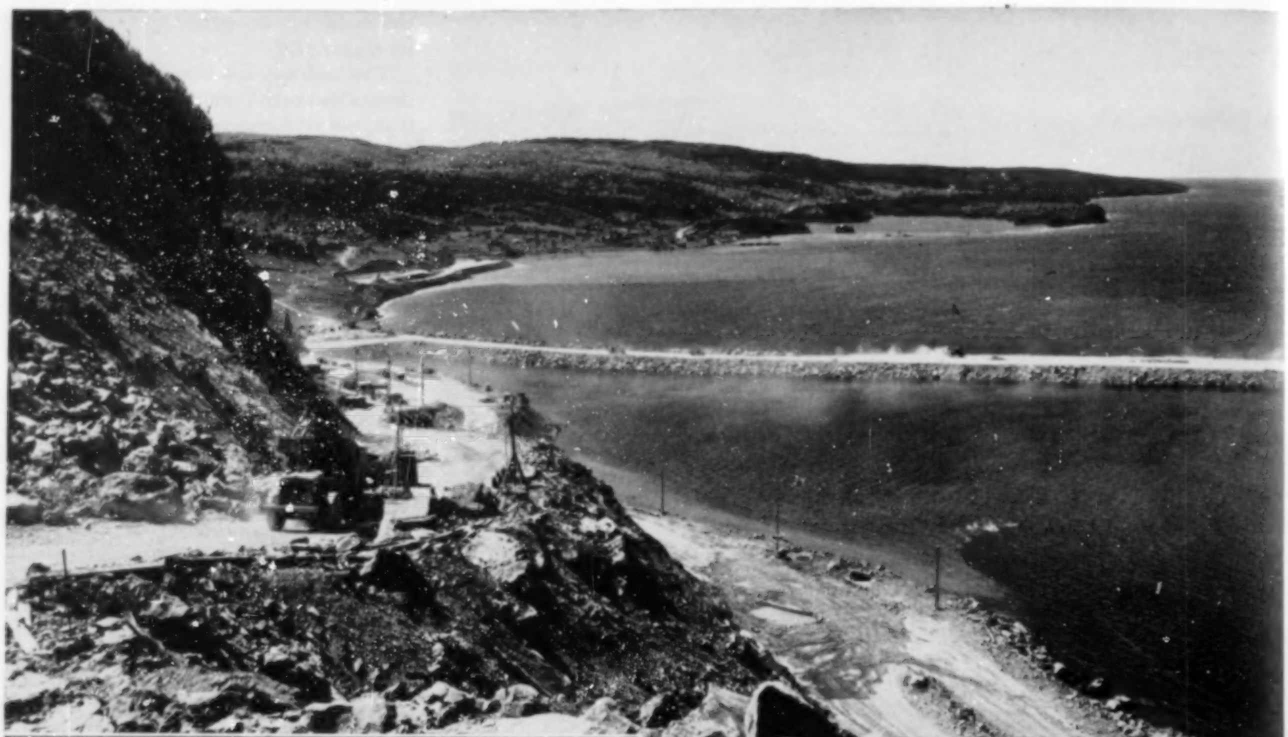
Fifty years of financial wrangling was broken when the late Premier Angus L. MacDonald of Nova Scotia made it clear that his government was willing to pay half of the undertaking if the Federal Government of Canada would participate. In 1948, The Honorable Lionel Chevrier, federal transport minister, appointed an independent Strait of Canso Board of Engineers composed of D. S. Ellis, dean of applied science at Queen's University, Kingston, Ont., D.P. Pratley and Dr. Arthur Surveyor, the two latter consulting engineers of Montreal, Que.

A bridge, a tunnel, and improved ferry

PLANS OF THE PROJECT

With curves at each end to help spread the water pressure and to make the approaches easier for trains to negotiate, the rock fill will extend 4300 feet across the 3600-foot Strait of Canso. Eighty feet wide at the top, it flares out at the base to an extreme width of 800 feet where the water reaches its maximum depth of 180 feet. The highway will occupy 32 feet of the surface width, the railroad 18 feet, a pedestrian walkway 10 feet, and there will be 10 feet of riprap on each side.

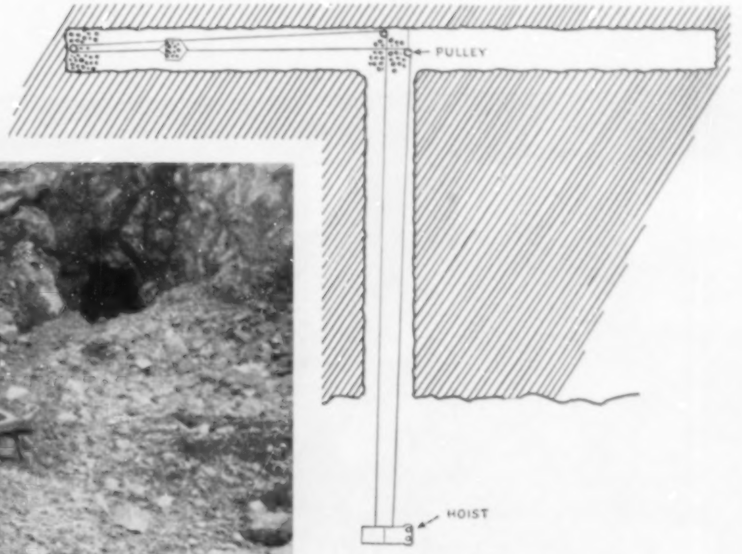

Breakwater
STRAIT OF CANSO
ARCHIE POND
C.N. Railway
Existing C.N. Railway
CAPE BRETON ISLAND
Siding Gates
Relocated Railway
PORT HASTINGS
Fill to El.+90'
BALACHE PT.
Lift Span
AULD COVE
Edge of Causeway on Bottom
Existing Cable
McKeen Pt
PLASTER COVE
Proposed Highway
Highway #4
Rock Quarry
NOVA SCOTIA
CAPE PORCUPINE
24' Wide Road
Single Track Railway
Sidewalk
Causeway El.+20'
L.W. El. 0-0
H.W. El.+6'
Construction Slope
Rock Fill
Expected Final Slope
Bottom of Strait – Either Bare Rock or Gravel on Rock
TYPICAL CROSS SECTION OF CAUSEWAY LOOKING TOWARDS CAPE BRETON
Navigation Lock
Final Ground Elevation + 20'
Existing Ground Elevation
Existing Railway
Relocated Railway
Assumed Rock Elevation
Area to be Excavated
Anchor Rods 12' long 5' c-c
TYPICAL CROSS SECTION OF NAVIGATION LOCK

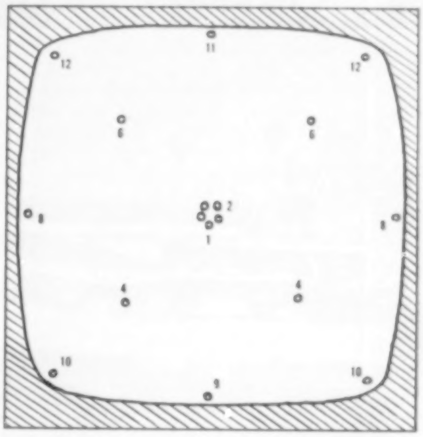


MOVING A MOUNTAIN PIECEMEAL

Nature co-operated with the builders by placing Porcupine Hill adjacent to the mainland coast, its granite core convenient for quarrying. The picture above shows the higher of two haulage roads climbing its slope. The roads converge near a weighing station at the approach to the causeway, which is seen stretching towards Cape Breton Island out of view at the right. The average blast shatters about 25,000 tons of rock, which is loaded by 6-yard electric shovels into Euclid trucks (below). Boulders too large to handle are reduced by blockholing and secondary blasting. The Canadian Ingersoll-Rand Jackhamer illustrated (left) is normally a 1-man drill but in this instance the operator received a little extra push from a buddy in order to get the final few inches of hole from an extra-long drill steel.

PHOTO CREDITS: TOP, NATIONAL FILM BOARD OF CANADA; LEFT, NOVA SCOTIA BUREAU OF INFORMATION; RIGHT, IMPERIAL OILWAYS





COYOTE-TUNNEL SETUP

At the upper-right is a plan drawing of the setup for mucking a coyote tunnel with a scraper by an air hoist stationed outside. After the rock is drawn to the intersection at the inner end of the adit, the pulleys are rearranged for pulling it on out. Above, mounted on a wooden sled weighted with rocks, is the Ingersoll-Rand 2-drum hoist that is utilized for the purpose. The 10 tons of explosive consumed in each blast is loaded on another sled and pulled into the hole by the same means. The drawing at the right shows the drilling pattern used in excavating a tunnel. The holes are drilled 5 feet deep, loaded with 40 percent ammonia dynamite and detonated with millisecond delays in the sequence indicated by the numbers.

service also were considered, but the causeway won out partly because of the successful completion in 1949 of a similar structure—an equally long but shallower fill across Barrington Passage between the mainland of Nova Scotia and Sable Island. The idea of a bridge, which actually reached the plan stage, was finally discarded in view of the uncertainty as to how the piers would stand up under the combined force of drift ice and the average tidal flow of 1.25 million feet per second. The maximum depth of water is 180 feet, making the Canso Causeway the deepest in the world.

The project got underway when the first contract was awarded on May 15, 1952, to the Vancouver firm of Northern Construction Company & J. W. Stewart Limited. Preliminaries such as assembling equipment, constructing access roads and putting up camp buildings took three months. Then, on September 16 a ceremony was held during which The Honorable Lionel Chevrier set off the first quarry blast and Premier MacDonald dumped the first truckload of fill into the strait.

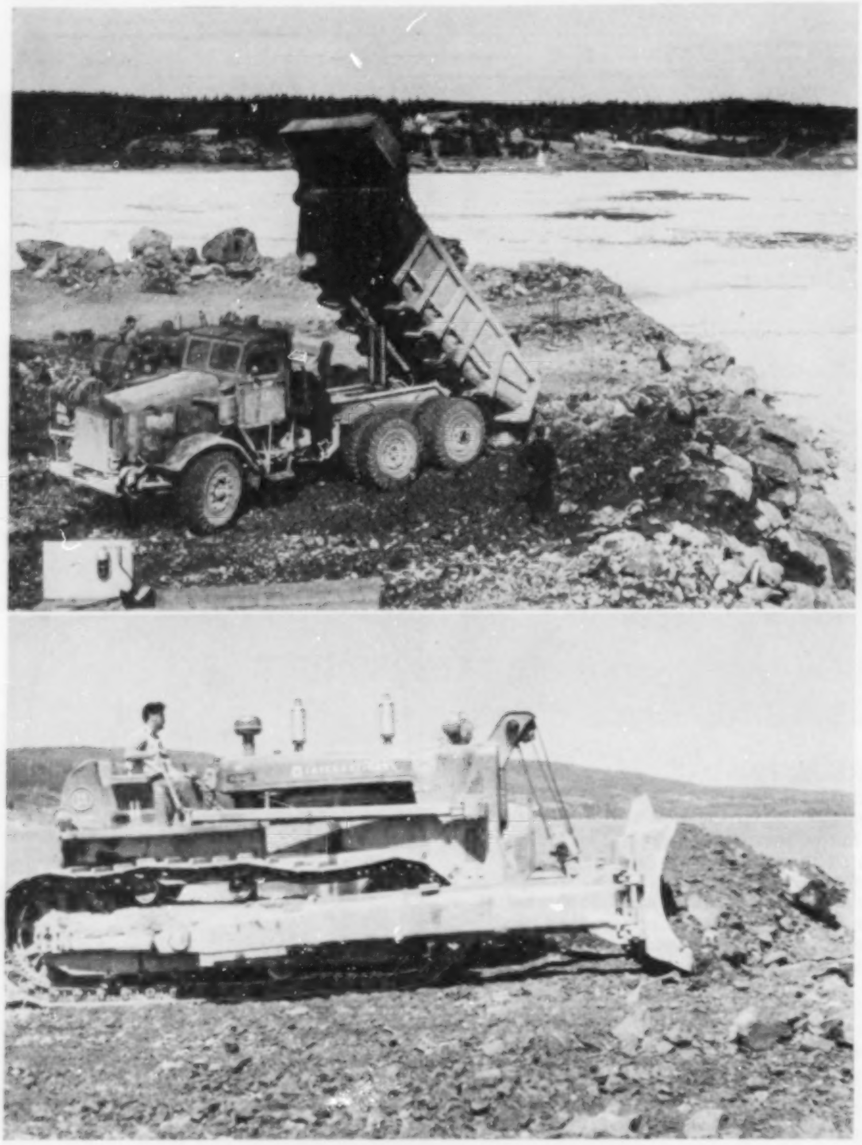
The entire project was designed by O. J. McCulloch & Company, consulting engineers of Montreal, and is divided into three main phases: construction of the rock-fill causeway; changing rail and highway approaches on both sides of the waterway; and building an 850-foot lock on the Cape Breton side. The latter will be on the same scale, except for length, as that in the Welland Canal between Lake Erie and Lake Ontario.

The completed causeway will describe an elongated letter "S" 4300 feet long and extending from the mainland near Cape Porcupine to Balache Point on Cape Breton Island. It will carry a walkway, a 2-lane (22-foot) highway and a single-track rail line. Its crest will be 14 feet above high-water level and 20 feet above low water, and at the deepest point, because of its gently sloping sides, the base will have a width of 800 feet, or ten times that of the top. As designed, the slope called for one horizontal to one vertical plane in anticipation of a settlement of 1¼ to 1. However, in the deeper sections it seems that it will be closer to 1½ to 1.

The faces are to be riprapped with rock (minimum weight each, 4 tons) to protect them against the action of water, air and ice. Some 160,000 cubic yards will be used for the purpose and will be carried 5 feet below low water on the south side and 10 feet below on the north side.

The causeway, together with its shore approaches on the mainland, is being built by Northern Construction & J.W. Stewart, while rail changes on the mainland are being made by Modern Construction Company of Moncton, N. B. On Cape Breton, the lock system and the highway approach are being built by T. C. Gorman Construction Company, of Nova Scotia, and the railroad approach by Wasson Construction Company.

To give an idea of the immensity of the job, a spokesman for the Government of Nova Scotia has described the causeway in terms of the pyramids and estimated that it will bulk as large as the great Pyramid of Cheops, plus at least one of the others nearby. When we think that it took 30 years to build the Cheops Pyramid with three million Egyptians toiling in relays of 100,000 at a time, then we can appreciate what modern machinery is accomplishing. By means of it, the Canso contractors will be able to handle 30 percent more rock in about 28 months with an average working force of 170 men. It should be borne in mind, however, that the huge blocks of stone in the pyramids not only had to be quarried and dragged long distances but also cut to dimensions and hoisted in



ADDING THEIR BIT

Trucks weighing 80 tons loaded dump their burden well back from the edge of the creeping causeway, and the material is then pushed off the side or end by a bulldozer having an extra-long spar. An average of 400,000 tons of rock has been placed monthly.

place, whereas the material in the causeway is simply dumped.

Fortunately, there is an adequate source of rock for fill within 1600 feet of the Nova Scotia end of the causeway. It is 600-foot-high Porcupine Hill which is providing the necessary durable granite. The quarry area spreads along a water frontage of 1600 feet, and the excavation extends 400 feet back into the hill. Two access roads were constructed, one on a grade of 17 percent and the other, farther down the hillside, with an easier slope. From these were established three quarry levels at Elevations 20, 125 and 250.

The coyote tunnel method of quarrying was decided on for two reasons: because the hill's surface irregularities made benching difficult and because it could be counted on to supply both the smaller size material for fill and the large chunks of rock to serve as riprap. In its usual form, a coyote tunnel is of T shape, with the stem of the letter running into the rock at right angles to the quarry face and the crossbar extending for equal distances in both directions from the inner end. When the stem is of great length, two crosscuts, spaced some distance apart, are generally driven. At Canso the crossbars of the T are uniformly 100 feet long and the length of the stem varies with the height of the rock face. If the latter is 100 feet or less, the stem will be half as long. If the face height exceeds 100 feet, then a 100-foot adit is driven and there will be two crosscuts, one at about 45 feet in and the other at the terminus. The entries are made only big enough for men to work in them, in this case 3.5x5.5 feet. They are arranged in groups of two or more, with their portals 125 feet apart, which leaves 25 feet of rock between the outer ends of the crosscuts.

Drilling of the adits is done with Jackhamers fitted with chucks to take ⅞-inch hexagon steels with 4¼-inch shanks. They are mounted on airlegs and furnished with air by two Ingersoll-Rand portable compressors—a 500-cfm unit and a 600-cfm Gyro-Flo. Mucking is done with 30-inch hoe-type scrapers pulled by double-drum hoists also of Ingersoll-Rand make. This hoist was selected because it has a medium and a long drum, the latter being of advantage because it provides for an extra-long tail rope and speeds the return of the empty blade. Water for drilling is supplied by a pressure tank equipped with a coal-fired heating coil for winter operation.

After the coyote pattern is established it is necessary to calculate the "neat" yardage bounded by the quarry floor and vertical planes outlining the coyote limits. Next the amount of powder required per cubic yard of material is decided. This ranges from 1.5 to 2.0 pounds, depending on the character of the rock, which varies within the quarry area. The explosive is distributed in pockets; an average 50-foot tee, for instance, would have two with the heavier charge in the outermost pocket.

Before powder loading starts, pin holes are drilled in each side of the adit and tees for wooden plugs to which the Primacord, by which the charges are detonated, is tied in a continuous loop. The line is also criss-crossed between pockets and at intervals in the adit. The explosive used is 40 percent ammonia dynamite packed in 12½-pound bags delivered in boxes containing four each. Loaded on a wooden sled, the cases are pulled into the tunnel by the slusher hoist and then transferred into the tees by a light aluminum roller conveyor.

With the Primacord strung, a bundle of 40 percent Forcite in stick form is tied to the line on each side of every pocket and inserted in a box of ammonia dynamite to serve as a primer. In case of a wet working, a layer of boxes of Forcite, which has good resistance to water, is placed in the bottom of the pockets. Formerly, the sections between the latter were backfilled with tunnel rock, but now only the adit and tees are filled. The material is drawn in by the scraper and backfilled by hand to the portal.

With all these preparations completed, two electric blasting caps are attached to each end of the Primacord projecting from the tunnel and connected in series with lead wires that are carried back to a 220-volt switch. As soon as all the equipment in the area has been moved back a safe distance, the shot is ready to go. By November first, 91 coyotes had been blasted, and these involved the driving of 16,667 feet of adits and tees.

The largest blast set off so far required 3200 cases of dynamite.

The rock brought down is handled by two Bucyrus-Erie electric shovels fitted with 6-cubic-yard buckets and powered by three diesel generator units. A 2½-yard Lima diesel shovel is also used in the quarry. The material is dumped into Euclid trucks, of which there are fourteen in service, and each load is weighed on a 100-ton Howe truck scale before it is hauled to the causeway. There bulldozers push the rock over the end of the gradually lengthening structure.

The completed causeway will have a width of 80 feet at the crest, but by the method of construction followed it is being made 130 feet wide at the start and is then cut back on each side by using a Manitowoc crane as a dragline until the top width is 60 feet. Two shelves are thus formed, the one on the north side at Elevation minus 10 and the one on the south side at Elevation minus 5. On these the riprap is placed with the Manitowoc equipped with an Owen 4-point rock grab.

Less massive, but more detailed from an engineering standpoint is the building of the sea walls, anchoring basins, canal and lock on the Cape Breton side. The channel, lock and entrance piers will have an over-all length of 1950 feet, a width of 80 feet, and the water over the sills of the lock will be 32 feet deep at low stage. The latter will have gravity-type walls 47 feet high and its gates will be 820 feet apart. They will be of the same type as those in the Chicago drainage canal and were chosen because they are capable of resisting pressure from both sides. At Canso they will have to withstand not only the ebb and flow of the tide but also drift ice. Railroad, vehicular and pedestrian traffic will pass over the man-made channel on a 300-foot swing bridge, and ships plying the strait will await their turn through the lock in the mooring basins and docks being built at both ends of the canal.

Work on the canal is proceeding behind a 900-foot earth-and-rock-fill cofferdam retained by steel sheet piling. Excavating is completed, and was done by wagon drills mounting DA-35 drifters and Jackhamers, both using Carset (tungsten-carbide insert) bits. The former machines put down a 2-inch hole, and the latter, which were utilized for popholing and for drilling in tight spots, were fitted with 1⅝-inch bits. Power to operate them was supplied by an I-R 600-cfm Gyro-Flo compressor and a Canadian Ingersoll-Rand 500-cfm unit, while air for isolated jobs was provided by a 105-cfm compressor.

Engineers of the Gorman Construction Company have estimated that 100,000 cubic yards of concrete will enter into the massive foundations for the swing bridge, lock sills, retaining walls and gate posts. Mixed and poured in the area at the rate of eighteen carloads a week, it is handled in 2-yard buckets loaded on trucks and hauled to the building sites where it is placed by a crane. Concrete work on the railroad bridges of the approaches is completed and that on the lock walls and sills is well advanced. When the channel is finished, 400,000 cubic yards of material will have to be dredged from the entrance and exit before it is ready for service.

HAPPY BOSSES

Key men for Northern Construction Company & J. W. Stewart Limited paused long enough near the end of the job to smile at the way it was progressing. Bill Goodwin (left) is project manager and "Gus" Vinblad is general superintendent.

Like many projects intended primarily for peaceful purposes with improvement of economic conditions the broad aim, the Canso job is of considerable significance to the West from the angle of defense. Aside from the facts that it will make it possible to ship industrial Sydney's products easier and faster than now and that enemy bombs would have little effect on the causeway, it offers another but less obvious advantage.

In the wintertime, all the ice that floats in the strait is what is known locally as gulf ice—small pans or fragments that break away from the shores' edges. When the waterway is finally blocked, the ice will be held in check and the stretch south of the barrier will become a deep water harbor open the year round—an additional Atlantic port, 10 miles long, free from natural hazards. With the seaward end protected by nets, gates and radar it would prove a safe base for naval operations, especially convoys.

On November 1, the causeway itself was within 500 feet of the Cape Breton shore and more than 9,000,000 tons of rock had been dumped. The remaining section is to be completed this month. The final opening date, sometime during the latter half of 1955, is still in doubt; but when it does arrive, the ceremony planned for the occasion will be worth watching. One hundred Scottish pipers will be there, and the famous "Road to the Isles" will be played as they march from the Nova Scotia mainland to Cape Breton Island over the new causeway.

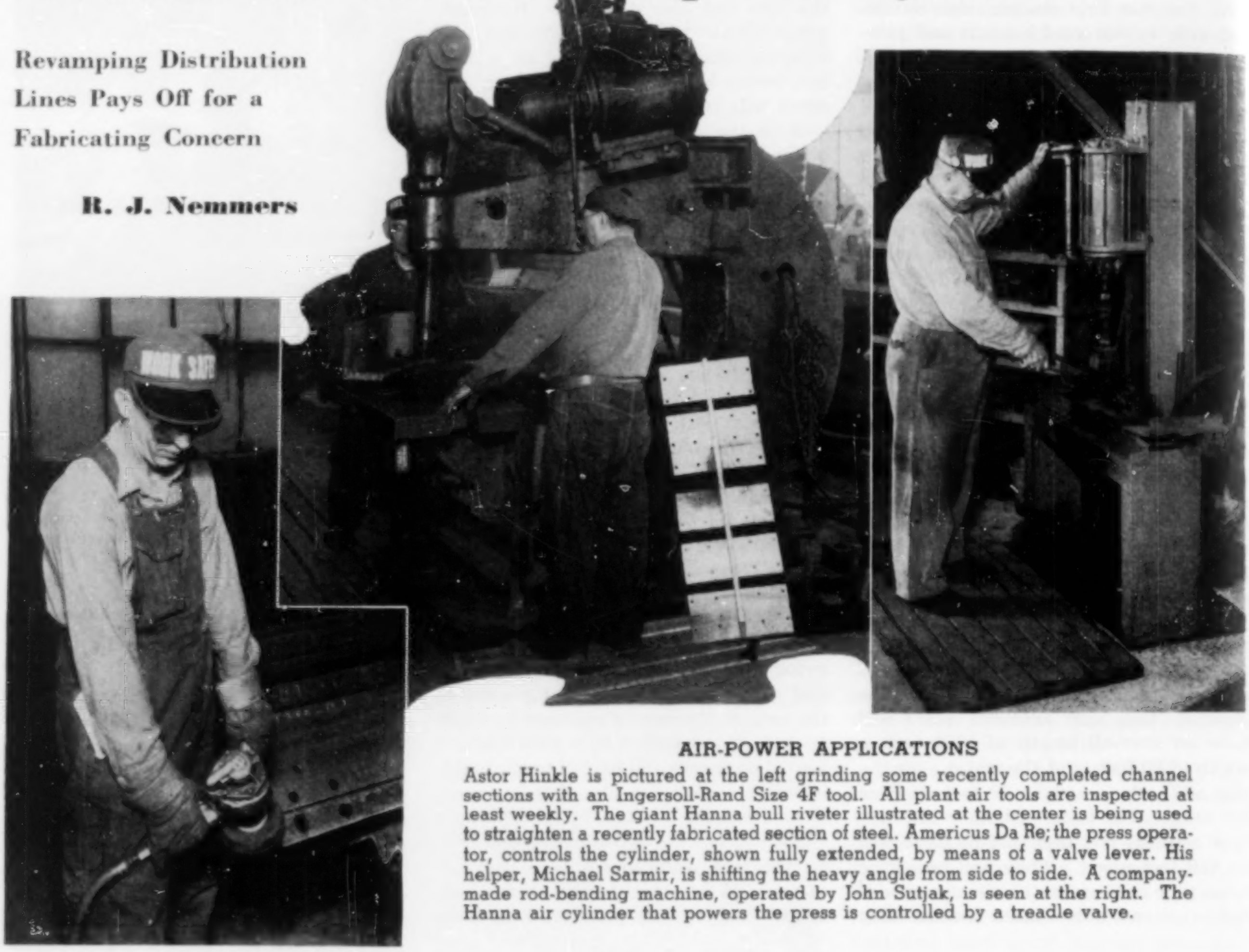
ICE VERSUS RIPRAP

Skeptics feared that a man-made roadway would be no match for the crushing strength of floating ice that normally raced through the strait, but for two winters the partly completed fill has resisted Nature's best efforts to budge it.

Steel Firm 'Wakes Up' Air System

Revamping Distribution Lines Pays Off for a Fabricating Concern

R. J. Nemmers



AIR-POWER APPLICATIONS

Astor Hinkle is pictured at the left grinding some recently completed channel sections with an Ingersoll-Rand Size 4F tool. All plant air tools are inspected at least weekly. The giant Hanna bull riveter illustrated at the center is being used to straighten a recently fabricated section of steel. Americus Da Re; the press operator, controls the cylinder, shown fully extended, by means of a valve lever. His helper, Michael Sarmir, is shifting the heavy angle from side to side. A company-made rod-bending machine, operated by John Sutjak, is seen at the right. The Hanna air cylinder that powers the press is controlled by a treadle valve.

AFTER World War II there was a lot of furor about the prefabrication of homes. It was hailed as something new in construction, and so it was for that particular branch of the industry. Yet, when one stops to think one realizes that most of the structural steel buildings, towers and bridges in existence were largely "prefabricated."

Long before a single piece of steel was raised from the ground at a building site, the manifold girders, beams, trusses and plates were formed to exact dimensions oftimes in a far off plant. If the design called for all-welded construction, then a great deal of advance fitting and welding had to be done. Similarly, if the structure was to be riveted and/or bolted, holes for the fasteners had to be drilled.

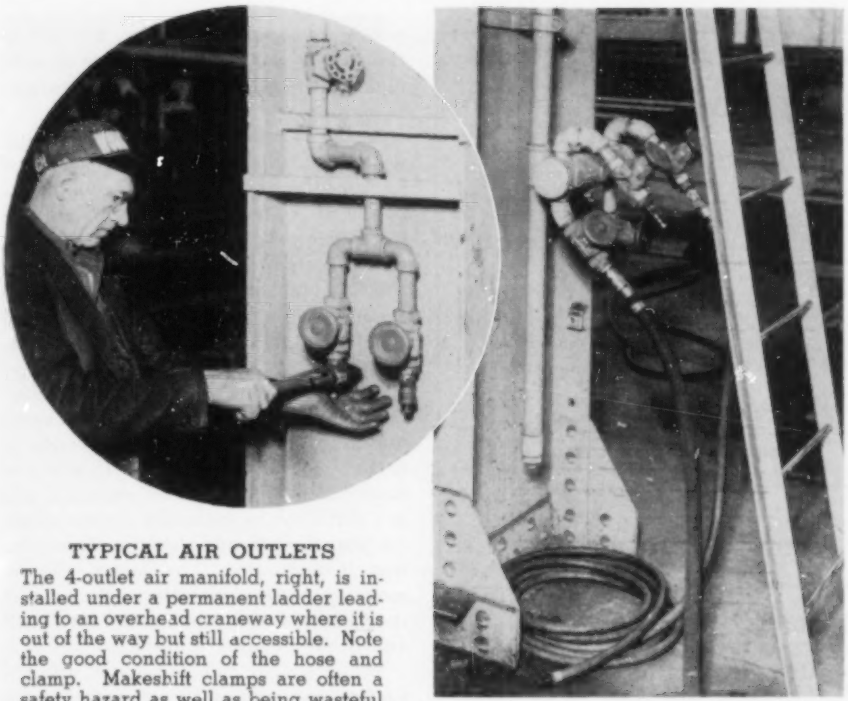
Beyond those basic preparations there were almost countless other details to be taken care of in what, to the layman, might have seemed a senseless hurrying, scurrying pattern. In fact, weeks would elapse before any but an experienced eye could make heads or tails out of the jumble of steel sections on the building site. In reality, each piece was carefully engineered and made, and each was coded or numbered so the erection boss, reading from his set of blueprints, could unerringly point to the one that would next go "up in the air" to take its proper place in the structure.

The one reason why most of this work is done in a steel fabricator's shop is that it is easier for all concerned. Otherwise many large machines would have to be shipped all over the country, skilled laborers would have to be uprooted from their homes and sent from job to job and there would always be the problem of inclement weather interfering with operations.

Compressed air plays a big part in the business of the steel fabricator as it does in the actual erection of the structure itself. Among the more important pneumatic machines used are riveters (both the giant "bull" type and smaller hand-held units), grinders, Impactools, drills, deburring tools, etc. Huge shears and presses are air-operated or controlled. Sandblast equipment, paint sprayers and oil forges require lots of compressed air for blowing and atomization. Some fabricators protect the steel with rust-resistant coatings which necessitates cleaning the metal with acid. Air under pressure transfers this acid from storage tanks to points of application.

Steel fabricators have learned to rely on compressed air because it is a low-cost and invaluable power medium when produced by efficient machines and used by efficient tools. Yet there is one phase of a compressor plant that is frequently overlooked and may be responsible for a loss of air. That is the distribution system—the network of pipes and hoses that delivers the air from the compressor to the equipment and tools. If air lines are outmoded and leaky it is like having an old employee sleeping on the job.

Taking steel of all shapes and sizes and converting it into huge buildings and towers is a fascinating business but also a tough, competitive one where a difference of only a few dollars can win or lose a bid. Any means of reducing expenditures, so long as it does not affect the quality of the finished product, will put a steel fabricator, or any other manufacturer for that matter, into a better



TYPICAL AIR OUTLETS

The 4-outlet air manifold, right, is installed under a permanent ladder leading to an overhead craneway where it is out of the way but still accessible. Note the good condition of the hose and clamp. Makeshift clamps are often a safety hazard as well as being wasteful of air. The other view shows Ralph Green of the plant maintenance force who installed all the Grinnell-Saunders valves. He is putting the final touches on a dual installation—the quick coupling fittings used on all hose outlets.

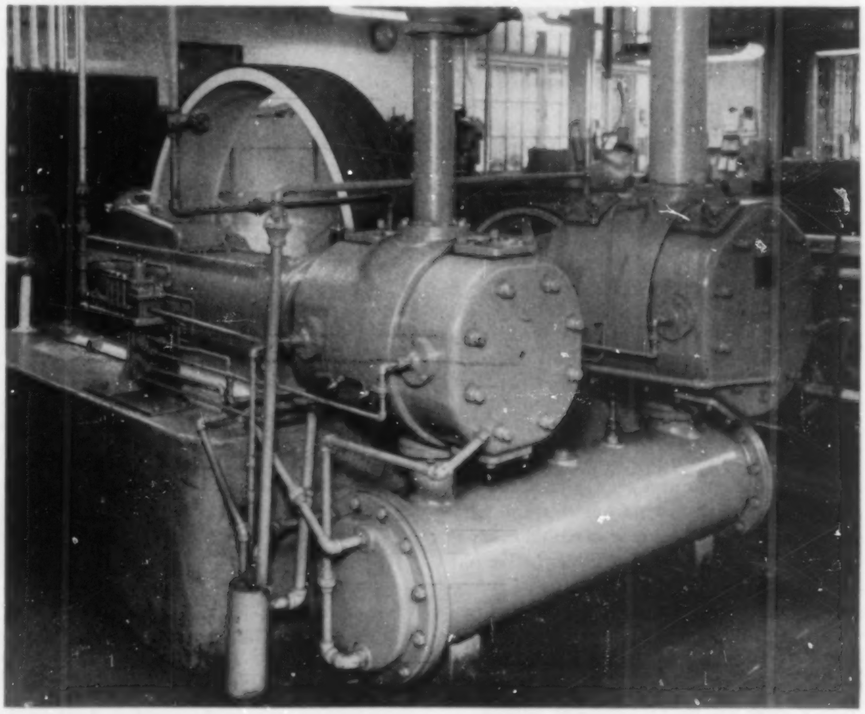
position competitively speaking. The story that follows is about the Lehigh Structural Steel Company, a firm which discovered that its air-distribution system was "sleeping on the job" and that modernizing it would pay off through increased production and lower power costs.

The 35-year-old concern, located in Allentown, Pa., takes its name from the Lehigh River which flows past the plant site. Over the river and lowlands, where the property is situated, passes a high-level bridge carrying Tilghman Street (until recently U. S. Highway 22). The crossing created quite a problem for the company that was solved by constructing what is believed to be the world's only S-shaped overhead craneway. It came about in this way: when the bridge was built piers were placed at intervals across the property, and several years later one was found to be right in the line of a proposed outdoor craneway extension. Because it was of the utmost importance that the facilities be expanded, company engineers, coöperating with the crane manufacturer, figured out a means by which the crane could be directed around a curve. (Accompanying this article is a picture and a description of the installation.)

From the start, Lehigh Structural Steel has emphasized safety, which is a vital consideration in every modification of the plant structure. In redesigning the compressed-air system engineers followed all the recognized safety rules and made sure that no outlet valve would protrude into a walk or production area where an unwary worker might run into it. Close attention to details such as this have resulted in one of the lowest accident rates in the industry. Beginning in the early 1930's, for example, company employees established a no-lost-time-accident record which was maintained for nearly a decade. Today, safety contests are staged regularly, always keeping before workers the basic idea that safety pays and accidents don't just happen.

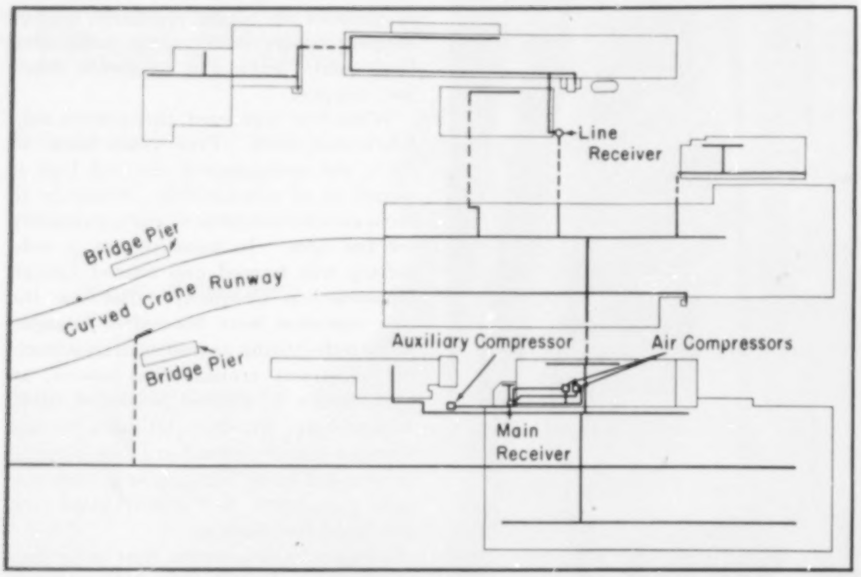
When first organized, the concern only fabricated steel. Five years later, in 1924, the management decided that it would be of considerable advantage to have an erection crew working primarily for the firm. In consequence, a subsidiary was formed and named Lehigh Construction Company. Because the two concerns were thereafter engaged in manufacturing as well as in constructing electrical transmission towers, an opportunity to expand presented itself. Accordingly, in 1930, Utilities Service Company, also a subsidiary, was founded to produce street lighting and transmission equipment for underground and overhead installation.

Obviously, a concern that is as progressive in plant design and operation as Lehigh Structural Steel is also foresighted in fields such as employee and public relations. One of the more recent practices introduced is the giving of free cold and flu "shots" at its dispensary. This is done to reduce absenteeism and to protect workers from loss of wages. Another project worthy of note is the Robert L. Kift-Thomas R. Mullen, Jr., Memorial Foundation, Inc., a nonprofit, charitable organization. It was established in 1949 under the guiding hand of Thomas R. Mullen, company president, who has long advocated that Amer-



MAIN AIR COMPRESSOR

An Ingersoll-Rand 100-hp belt-driven compressor that supplies the shops with air. It accounts for 520 cfm of the installed 1175-cfm capacity. Two other machines, a single-stage 340-cfm stationary unit and a 315-cfm "retired" portable are also available.



PLAN OF AIR LINES

Air mains and principal branches are indicated by heavy lines (broken lines where underground) and buildings are outlined in lighter ones. The drawing is to scale, but the craneway extends farther to the left than shown.

ican business give regular and systematic aid to private institutions dependent on public support—especially privately endowed colleges and universities.

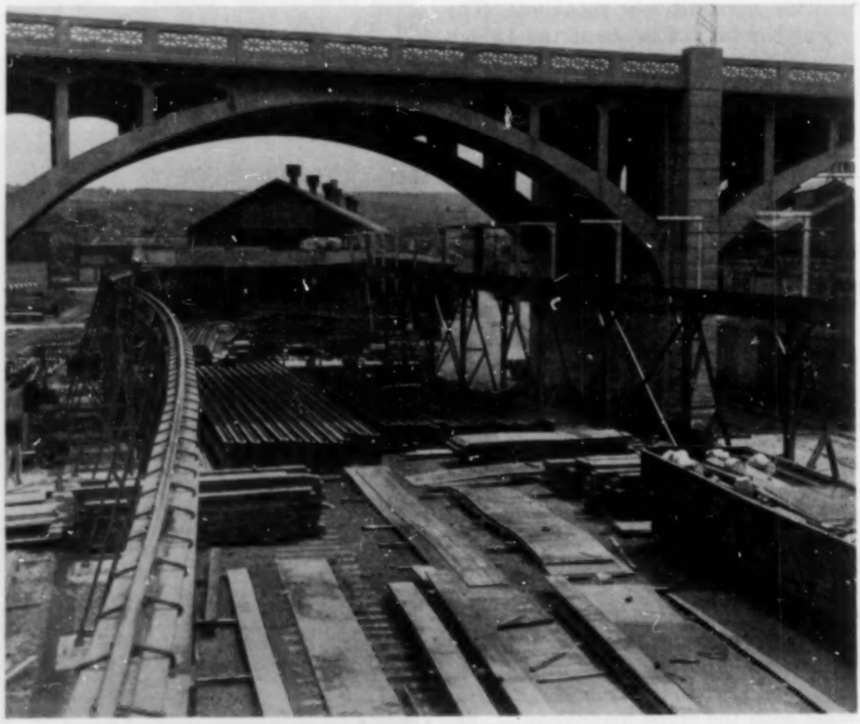
Lehigh Structural Steel and its subsidiaries annually contribute 5 percent of their net profits before taxes to the foundation. Although some gifts are made to charities that are national in scope, the foundation is primarily interested in promoting the interests of the community. To this end grants are made to young women who desire to become nurses, and scholarships for post-graduate work are awarded to Allentown nurses and teachers. Deserving college men and women aspiring towards degrees in teaching, civil engineering and other fields are given assistance, and funds are contributed to area colleges and universities as well as to many local philanthropic causes.

In 1919 the company had 60 employees; today its rolls number more than 600 workers. In addition, an average of 200 ironworkers per month is employed by the construction firm at varying places in the country. Plant facilities have grown until they now occupy 25 acres, seven under roof. This expansion is one of the principal reasons why a new compressed-air distribution system was needed. Like Topsy, the old one "just growed"—new outlets were added here and there and existing lines were extended. Although each section was undoubtedly well engineered at the time, there came a day when all of them didn't add up to an efficient whole.

The plant has an installed air capacity of 1175 cfm supplied by three machines: a 520-cfm 2-stage unit driven by a 100-hp electric motor; a 340-cfm single-stage compressor powered by a 62-hp motor; and a 315-cfm single-stage machine operated by a gasoline engine. The latter is of the portable type and was retired from service by the construction company. It is now a standby, but before the system was modernized was in well-nigh continual use like the two stationary units.

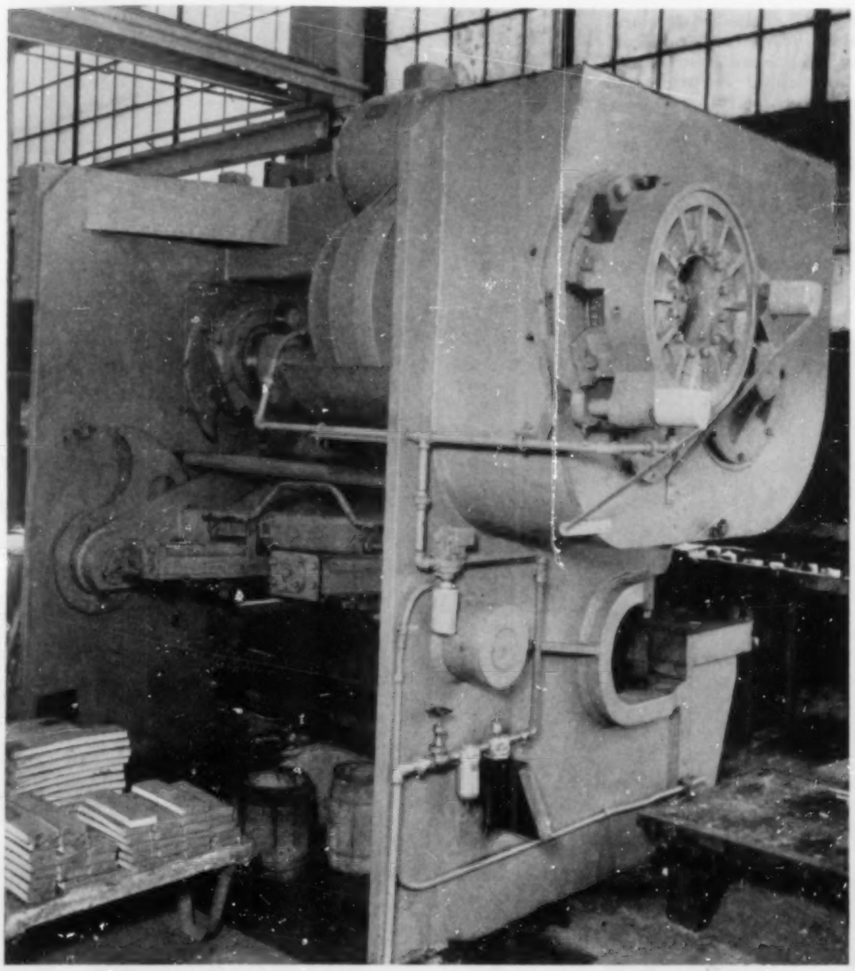
A careful check convinced the engineers that a large percentage of the air produced was being wasted through leakage, a view that subsequent experience has borne out. (At the time the work on the system was about half completed the 315-cfm compressor was taken off the line and started up once a week only to make sure that it was in good running order.) In addition, it was found that some of the pipes were too small for the load they were expected to carry and that the lines had more bends in them than were necessary. It was also determined that receiver capacity was not sufficient to maintain pressure during peak periods and that the aftercooler was inadequate. The latter allowed moisture to pass into the system where it condensed and was carried into tools and other pneumatic devices.

When a thorough survey of the old system was made it was found that the outlet valves, which could not be satisfactorily repaired, were the main cause of leakage. After appraising the situation the following steps were taken to remedy the defects. Several different



CRANEWAY WITH A CURVATURE

Believed to be the only one of its kind, this craneway was built in the form of an elongated "S" to dodge the bridge piers. It cost only about 10 percent more than if it were straight. The crane is made to follow the radii by using two pairs of wheels of different diameters at each end of the crane bridge: two on the outside and two smaller ones on the inside. At three break points in the runway the rail gauge changes and provision has been made automatically to shift the load there from one set of wheels to the other, but only at one end. The curves are parts of two concentric circles and the smaller wheels ride on the shorter or inside rail. All wheels revolve at the same speed, but the larger ones cover more ground with each revolution and the crane is therefore carried evenly around the curve. When traveling a straight section inside the shop it rides on the four larger wheels.



POWERFUL SHEAR

A large Steelweld plate shear that easily reduces thick steel plates to pieces such as are shown on the skid. It is equipped with a pneumatic clutch (right end) that insures fast, positive engagement of the motor and ram and that also incorporates a brake. A Norgren Vitalizer unit (combination filter-lubricator) interposed in the air line that serves the unit removes any entrained moisture and dirt that might lead to operating difficulties.

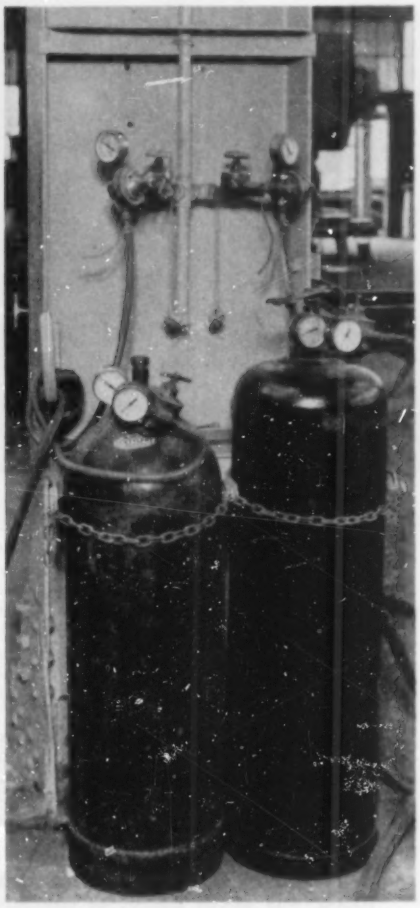
types of outlet valves were installed "on probation" so the one that would stand up best under the prevailing service conditions could be selected. Concurrently, a new receiver and aftercooler were provided and lines resized and straightened.

By the time the various alterations were completed the Saunders diaphragm valve, manufactured by Grinnell Company, had proved its worth to the engineers and was installed throughout the system. This work was entrusted to one man who did the necessary pipefitting during "off" hours in order to minimize interference with regular plant operations. One other improvement was made: when the existing receiver was removed it was not scrapped but placed near one end of the network to store air power where needed.

As a result of all these changes, the two main compressors, even with the 315-cfm unit off the line, no longer have to operate at top capacity. Thus, a definite power saving has been effected. Air lines are free of condensate since the new aftercooler was installed, and air tools should last longer because the absence of moisture insures proper lubrication. The compressors, too, will require less maintenance because they do not have to work so hard. And out on the production floors more is being accomplished because tools are operating at peak efficiency—all are getting enough air at the necessary pressure even at the most remote outlets.

Lehigh Structural Steel has found other ways of getting the most out of its compressed-air equipment. It has put in practice a good preventive maintenance program under which each air tool is inspected at least once a week by a qualified man, thus effectually extending its service life. Grinders, for example, are checked for speed, condition of the guard and air connection, and for lubrication. Records of the data are kept, each tool being identified as to type, manufacturer and serial number, and another number which Lehigh Structural Steel assigns. The inspectors' initials and dates of examination complete the reports. Going over them at periodic intervals gives company engineers a good idea as to how the tools are standing up and also as to the operating characteristics of different types.

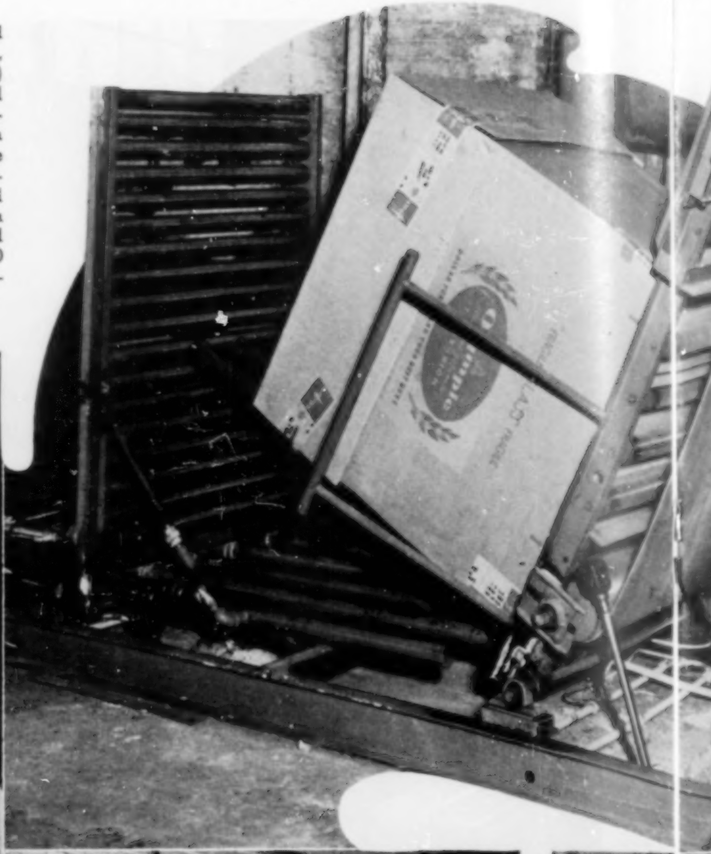
One of the plant's most important air applications has to do with the automatic fire-protection sprinkler systems. Because many of their pipes are located where they might freeze in winter, the networks are charged with compressed air instead of water. Then, if a fire should occur and cause the sprinklers to open, the loss of air pressure would immediately trip valves and admit water to the lines. Other uses of air, some of the more interesting of which are illustrated, closely follow those enumerated for the industry.

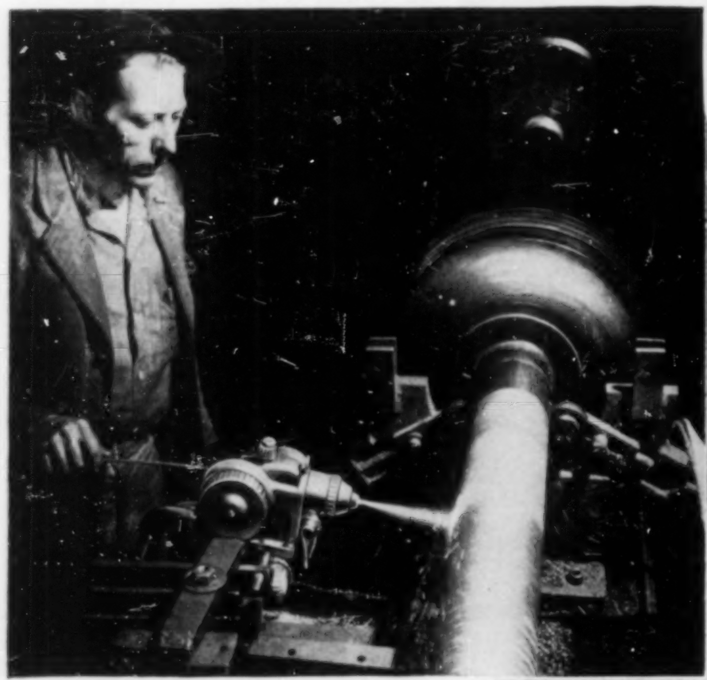


OXYGEN DISTRIBUTION

Oxygen, which is used throughout the plant with acetylene for cutting and welding metal, is received in conventional pressure cylinders and fed from a bank of them into a piping system that delivers it to outlets such as the one pictured. Hose lines are shown attached to control valves furnished by Air Reduction Company, which supplies the gases. The acetylene that is combined with the oxygen at the torches is stored in the cylinders in the foreground. The oxygen distribution system was installed when cylinder fittings were not as leakproof as they now are, and it was considered good safety practice not to have oxygen and acetylene cylinders close to each other.

A shop-built air-operated "flip-flop" at the Long Island City, N.Y., plant of Olympic Radio & Television, Inc., turns over cartons containing television sets (right) so that the bottom flaps can be sealed. Incorporated in the end of the packaging conveyor line, it is a double-tilting fixture each section of which is actuated by a pair of 4½-inch air cylinders using 80 psi air from the shop line. The turnover is accomplished in two 90-degree steps and the cartons are delivered open end up to a roller conveyor. As many as 600 television sets weighing from 73 to 300 pounds each, are handled daily. The device, which cost $3500, saves $24,000 a year and has materially reduced accidents by eliminating a difficult manual operation.





The picture above shows molten stainless-steel alloy being sprayed by air on a revolving compressor piston rod by a Metallizing Engineering Company gun into which the metal is fed in wire form (left). When in operation, the 5¼-inch-diameter rod is subjected to wear for about 2½ feet of its length on each side of a centrally located piston and has to be metallized to restore it to its original size. After being turned down 0.001 inch, it was threaded and then roughened with a special tool to produce a surface to which the alloy would adhere intimately. It was then sprayed to a diameter 1/32 inch larger than the finished size and ground to final dimension. The cost of metallizing was about $250, as compared with $1000 to $1200 for a new rod.

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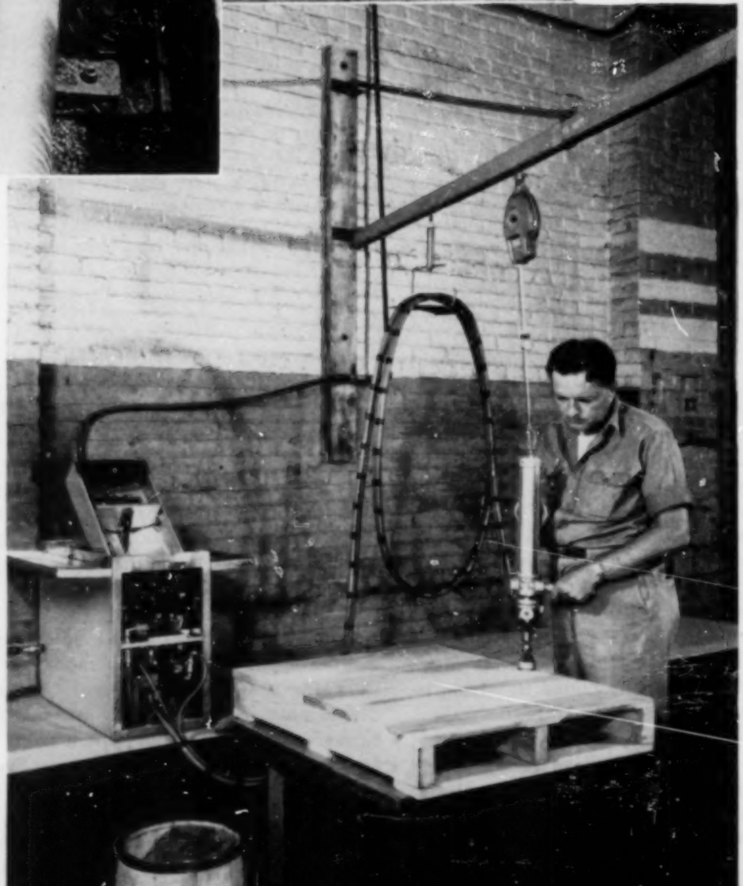
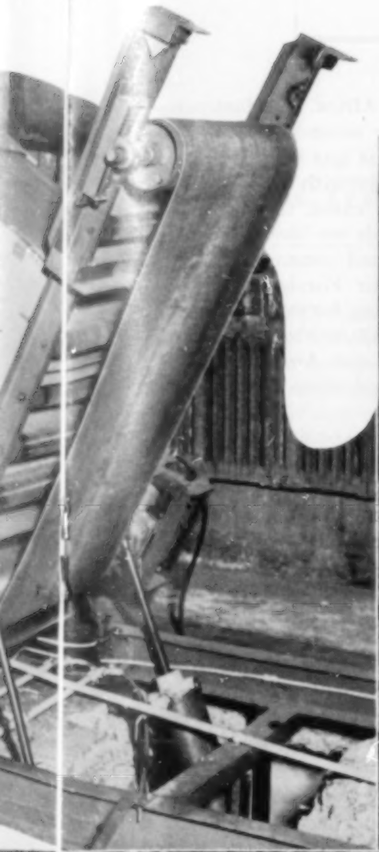
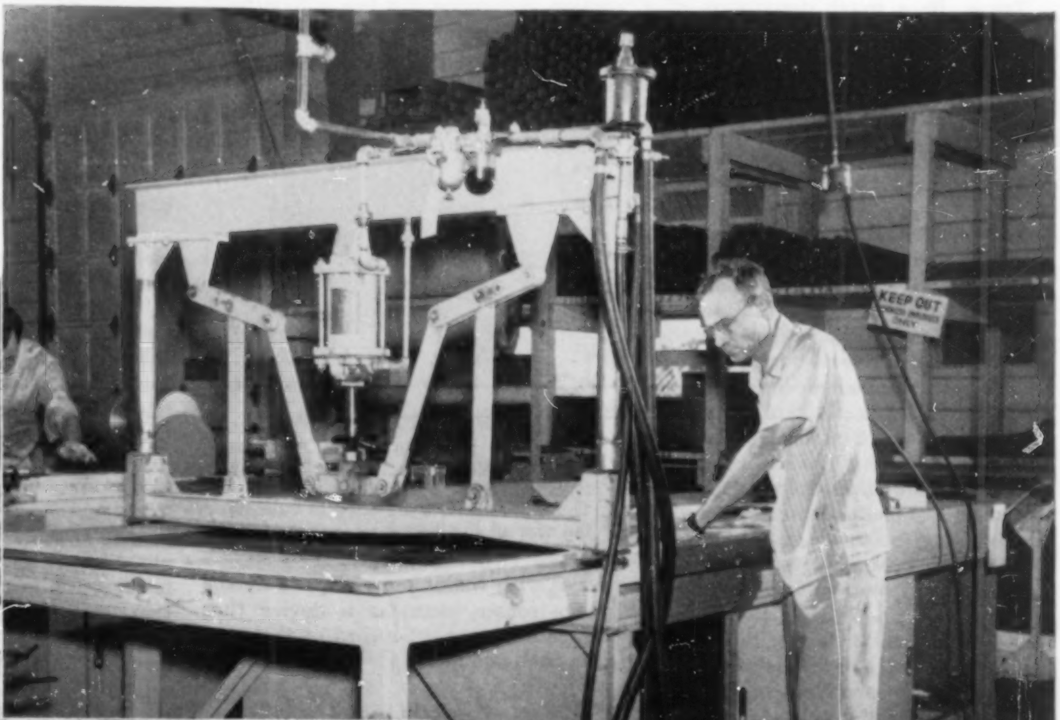
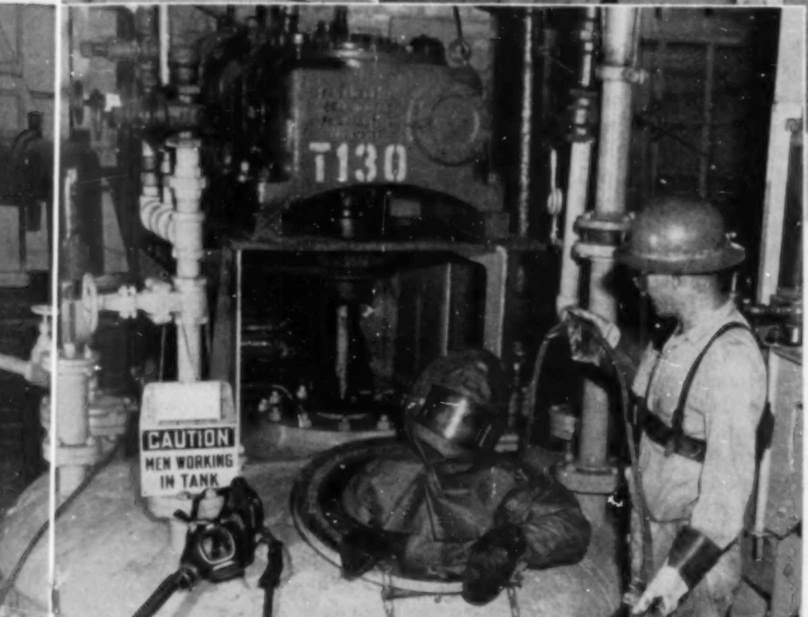


The man pictured at the right is nailing a pallet together with a Morgan portable air-operated driver. Nails of any desired size from 4- to 8-penny are aligned in the air-powered, oscillating hopper at the left and delivered to the machine by plastic hose. Each nail is hammered home with a single blow, and a rate of 50 nails per minute can be maintained. The driver, which weighs 8½ pounds, is suspended from an overhead balancer and uses about 15 cfm of air at 80-90 psi pressure.



Compressed Air At Work . . .





To obviate tying up space required to stock many different sizes of paperboard shipping cartons and to overcome other problems incidental to buying and handling them, Temco Aircraft Corporation now makes containers as they are needed in its Dallas, Tex., factory. The first of the three manufacturing steps involved consists in laying out the corrugated board to size and scoring it along bend lines in the company-designed machine pictured above. A 5-inch-diameter air cylinder, operated by a pedal, exerts pressure on a 5-foot-long blade through toggle-action linkage that doubles the force applied and distributes it evenly. The blade indents the cardboard sufficiently to break down the corrugations but not enough to damage the waterproofing content. Sheets thus scored are cut at the corners with a bandsaw, then folded into box shape and stapled.

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A ventilated, "anti-contamination" suit (left) that is both safe and comfortable to wear has been developed at Du Pont's Chambers Works in New Jersey for men working in tanks or other vessels that contained toxic or corrosive chemicals. It is made of a thin and light but tough impregnated fabric that is substantially impervious to gas or liquid. Air, at a temperature and humidity that answers the needs of the wearer, is pumped into the garment through a strong, flexible metal-clad hose that doubles as a lift line. A tee connection directs some of the air into the suit and the remainder into the helmet. The exhaust port is under the bib of the hood. The slight pressure maintained inside the suit prevents fumes or dust from entering.

This and That

Tying Down a Dam

Roof bolting in reverse would be a rough description of a technique recently applied in India to strengthen the 60-year-old Tansa Dam that impounds 90 percent of Bombay's water supply. When engineers noticed that the 173-foot-high structure built of hand-placed masonry was theoretically in danger of failing when the reservoir behind it was full, steps were taken to bolster it. Upon the recommendation of André Coyne, French dam authority who was called in as a consultant, the barrier was tied down to its foundation rock with steel cables.

The job entailed drilling 2½-inch holes through the structure from the crest and as much as 35 feet into the basement rock. Cables of high-tensile steel, splayed at the lower ends to provide a better bonding surface, were then inserted in the holes and grouted into the foundation. After that the cables were tightened by means of hydraulic jacks mounted on top of the dam, thereby putting the structure under compression, as is done in the case of the new technique of prestressing concrete members. Finally, each cable was grouted in throughout its full length.

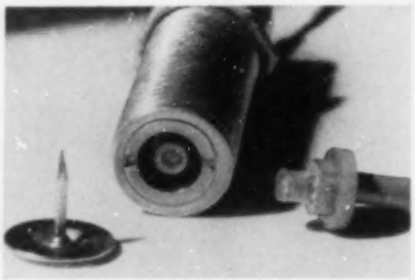
A similar treatment was given the Cheurfas Dam in 1935, where André Coyne was also in charge of the work. The operations at Tansa cost $2¼ million but are considered to have, perhaps, saved the barrier from going out during the three months preceding September 1 when monsoon rains exceeded 114 inches and broke a 118-year record.

* * *

Test-Tube Tempest

You don't have to set off an atom bomb to determine the effect of one. Scientists at the Illinois Institute of Technology, in Chicago, get the answer with an 8-inch-square, 18-foot-long tube. They build up pressure in one end of it with compressed air, then pierce a plastic partition to release a shock or pressure wave which travels down the tube to a model, a small block of steel, mounted in the far end. By measuring the pressure of the blast upon the latter, its effect on most types of structures can be closely predicted.

The measurements are taken by means of tiny pressure gauges at different points on the surface of the block. Although they are believed to be the smallest ever made, they can measure the pressure of a breeze or a wave that would topple the sturdiest building. Inside the after part of each gauge is a little tube of barium titanate. The blast subjects the gauge to pressure, which is then transferred to the tube as a squeezing action, deforming it a few millionths of an inch. This generates electrical voltage by what is known as the piezoelectric effect. The electrical output, which varies with the amount of pressure the gauge senses, actuates a device that makes a permanent record of the pressure change on film.



MINIATURE GAUGE

The gauge is shown on the right, by itself. In the center it is housed in a typical fitting for use in a shock tube. The thumb tack is included to indicate the size of the gauge.

* * *

Railroad Tie Trade

Uncle Sam is a big exporter, but mainly of manufactured goods and machinery of types in which we excel because of our technological know-how and highly developed mass-production methods. We are a large importer of raw materials, especially of those naturally occurring ones of which we have none or not enough to meet our needs. In general, the things that the land yields in many parts of the world besides America can be bought for less outside our borders than at home because our wage scale is the highest. In view of these circumstances, one would hardly expect to find us listed as an exporter of railroad ties, but in reality we are a considerable factor in the international tie trade.

According to *Foreign Commerce Weekly*, publication of the U. S. Department of Commerce, more than 10,000,000 ties enter into international commerce annually, and the United States exports around one-fifth of them. We normally sell more than 10,000 a year to each of fifteen countries. Last year we sold $7.7 million worth abroad, and only France bettered this mark. Since 1950 our best customer has been the United Kingdom. Canada, a heavily wooded country and itself a tie exporter, was, surprisingly, our second-best purchaser, probably buying hardwood ties which she does not produce. Then followed, in order, Belgium, Mexico, Union of South Africa, Venezuela, The Netherlands, Greece and Portuguese East Africa. The last-named country was our second-best customer in 1953 because it has been building a connecting railway with Southern Rhodesia. In many cases, ties have been bought with funds we have loaned the nations for railroad construction or rehabilitation. Our Foreign Operations Administration has, for example, recently advanced $2,000,000 to Spain for the purchase of ties, and American exporters may get a good share of the 800,000 order.

The international business goes to the low bidder, and as a lot of manual labor enters into tie production it is surprising that we can compete. Aside from ourselves, France, and Canada, leading world suppliers are Finland, Yugoslavia, Sweden, Australia and Austria. Each foreign nation has its own tie specifications, and they usually vary from ours particularly as to dimensions which, abroad, are commonly given in the metric system. Our producers must therefore prepare each lot especially to order.

* * *

Heroic Indian Memorial

A huge carved memorial to an Indian warrior is taking form on Mt. Thunderhead, South Dakota, not far from where the heads of Washington, Jefferson, Lincoln and Theodore Roosevelt were engraved by Gutzon Borglum on the face of Mt. Rushmore. Of heroic proportions (641 feet long and 563 feet high), the work will show Chief Crazy Horse, who led the redmen against General Custer in 1876. Mounted on his horse, a 44-foot feather rising above his 87-foot-high head, the noble brave will survey the region where he was never vanquished. The sculptor, Korczak Ziolkowski, decided to carve the statue after becoming friendly with Sioux Indians while he was assisting Borglum. The Sioux told him they couldn't understand why, in the area they long had held, there were monuments only of white men, none of their own heroes.

Taking up their cause, Ziolkowski, according to *The American Magazine*, located a suitable site on Mt. Thunderhead in 1948 and began working all by himself. So far he has declined financial aid from the Federal Government. He climbs to the mountain top on a 741-step stairway that he cut in the rock face and drills blastholes with a hand-held rock drill that receives its supply of compressed air through 2200 feet of piping that he laid. To date he has dynamited 500,000 tons of rock off the peak but has hardly made an impression on it. He expects the job to take him at least 25 years more.

Sprucing Up Old Barney

C. H. VIVIAN

BARNEGAT Lighthouse, no longer in service but one of New Jersey's most historic landmarks and a stellar tourist attraction, was recently sandblasted and repainted. In gleaming new garb but of the same color scheme as always—the upper half red and the lower half white—it will be ready next spring to greet the continual parade of photographers and painters who try out their skill on the 96-year-old "Grand Champion of the Tides."

The refurbishing job was done by John M. Burns of Bristol, Pa., a specialist in work of that kind on tanks, towers and other lofty structures. Operations were conducted from staging suspended by ¾-inch manila ropes from a walkway that encircles the lighthouse about 20 feet below its tip 172 feet above ground level. The staging was made of light wooden sections, each resembling a ladder with planks laid on the rungs. Four of these units hanging on the four sides formed a square-shaped platform extending around the structure. As their ends were too far away from some of the surface being worked on to reach it conveniently, another similar but slightly shorter piece was laid across the angle between two adjacent main sections.

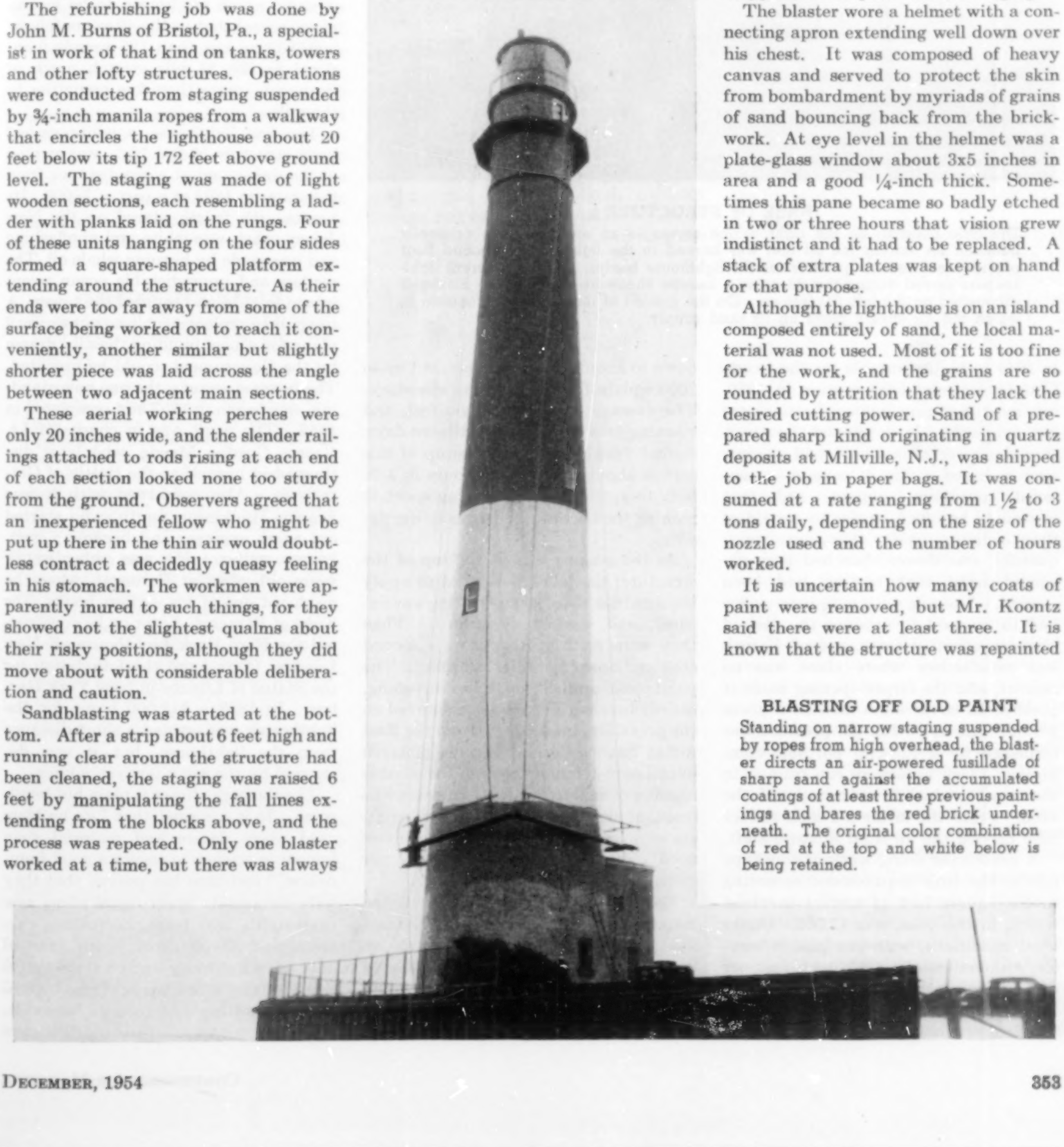
These aerial working perches were only 20 inches wide, and the slender railings attached to rods rising at each end of each section looked none too sturdy from the ground. Observers agreed that an inexperienced fellow who might be put up there in the thin air would doubtless contract a decidedly queasy feeling in his stomach. The workmen were apparently inured to such things, for they showed not the slightest qualms about their risky positions, although they did move about with considerable deliberation and caution.

Sandblasting was started at the bottom. After a strip about 6 feet high and running clear around the structure had been cleaned, the staging was raised 6 feet by manipulating the fall lines extending from the blocks above, and the process was repeated. Only one blaster worked at a time, but there was always a companion on the staging for safety. He assisted in handling the tackle to lift the staging and performed other necessary services. To even things up, the two men exchanged duties at regular intervals, and sometimes the job superintendent, Louis Koontz, went aloft to take his turn at the gun. At other times he saw to it that the machine in which the sand and air were mixed was kept charged with abrasive, closed the valve on the sand delivery line when the work stopped and helped raise the staging.

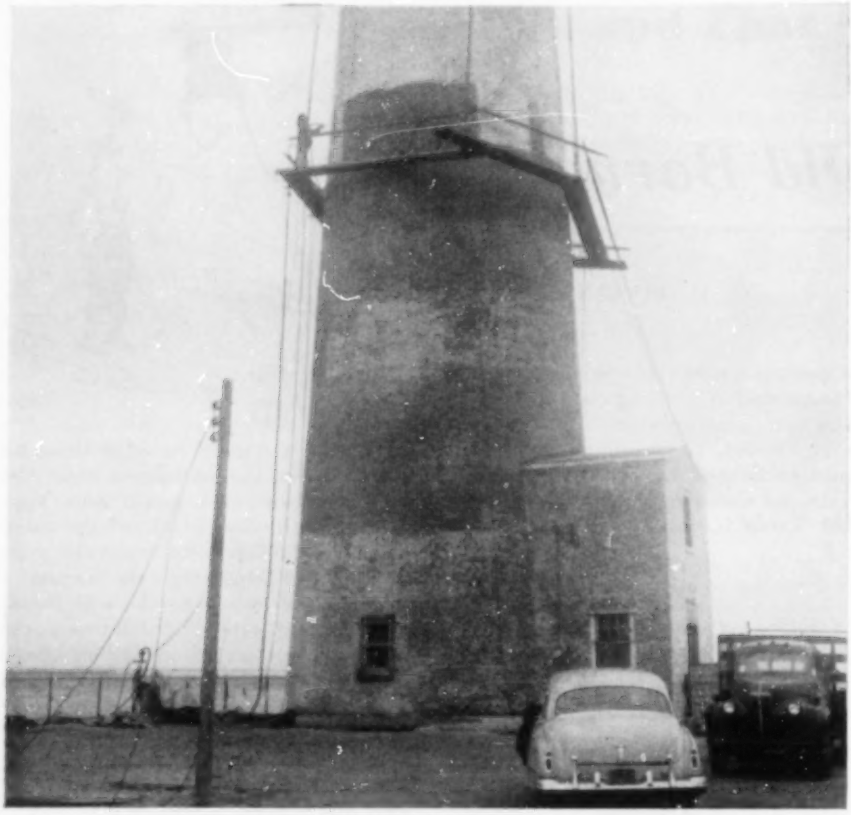
The blaster wore a helmet with a connecting apron extending well down over his chest. It was composed of heavy canvas and served to protect the skin from bombardment by myriads of grains of sand bouncing back from the brickwork. At eye level in the helmet was a plate-glass window about 3x5 inches in area and a good ¼-inch thick. Sometimes this pane became so badly etched in two or three hours that vision grew indistinct and it had to be replaced. A stack of extra plates was kept on hand for that purpose.

Although the lighthouse is on an island composed entirely of sand, the local material was not used. Most of it is too fine for the work, and the grains are so rounded by attrition that they lack the desired cutting power. Sand of a prepared sharp kind originating in quartz deposits at Millville, N.J., was shipped to the job in paper bags. It was consumed at a rate ranging from 1½ to 3 tons daily, depending on the size of the nozzle used and the number of hours worked.

It is uncertain how many coats of paint were removed, but Mr. Koontz said there were at least three. It is known that the structure was repainted



BLASTING OFF OLD PAINT
Standing on narrow staging suspended by ropes from high overhead, the blaster directs an air-powered fusillade of sharp sand against the accumulated coatings of at least three previous paintings and bares the red brick underneath. The original color combination of red at the top and white below is being retained.



BASE OF STRUCTURE

The little building on the right, which serves as an entrance, was originally intended for storing the oil that was burned in the light and its second floor provided emergency quarters for the lighthouse tender. Eleven different lightkeepers served during the 83 years a beacon shone from aloft. The blaster is silhouetted on the left, 50 feet up. On the ground at the left is a receptacle in which the air stream picks up its sand supply.

in 1949 to be presentable for the Ocean County centennial celebration in 1950, but records of previous applications are not available. It developed, however, that the lower 25 feet or so had at some time received a film of cement or material containing cement, and that proved to be much harder to get rid of than ordinary paint. Blasting, consequently, was slower than had been expected until that section had been cleared. A nozzle with a ¼-inch orifice had to be used to produce the desired cleaning effect, whereas one of ⅜ inch was satisfactory where there was no cement, and the larger opening made it possible to cover more area in a given period. Air at 95-100 psi pressure was furnished by a 125-cfm portable compressor. Two lines were run from it to the vessel in which it was mixed with the sand. From the latter a 2-inch rubber hose carried the air-sand mixture aloft.

A contractor doing work of this type figures the time requirement according to the square feet of surface involved which, in this case, was 12,000. Under ideal conditions, with one gun in service, an average of 2000 square feet per day can be cleaned, but in actual practice this pace is not always attained. The indurate material slowed operations down to about 500 square feet, but up to 2000 square feet was blasted elsewhere. The average was 1000 square feet, and cleaning was completed in twelve days. Actual working time on a setup of this sort is about four to five hours in a 9-hour day, the remainder being spent in making the necessary changes in the rigging.

As the staging was at the top of the structure, the painters started to apply the first coat there when blasting was finished, and worked downward. Then they went back up to put on a second coat and down again for the third. The paint was applied by hand brushing, mainly because if it had been sprayed on the prevailing brisk breeze from the East would have showered surplus material over nearby buildings and the sizable number of fishermen and sight-seers who frequent the area. Three or more painters were on the job daily, and each averaged 2000 square feet of coverage per shift.

Nature, in the form of Hurricane Edna, delayed the work at the beginning. The contractor was all rigged up on Saturday, September 11, and intended to start sandblasting on the following Monday. He was warned that the storm might be severe in the area, but elected to take a chance on it not damaging his equipment. He guessed wrong, however, as the high wind banged the rather light staging against the lighthouse until it was worthless and snarled up the ropes so badly that it was decided to replace them too. Six thousand feet of new rope was ordered from Philadelphia, 65 miles away, and more staging was obtained from other jobs in the same general section. These materials were received in such good time that the job got underway only two days behind schedule.

Standing on the south shore of Barnegat Inlet at the northern tip of Long Beach Island, 6 miles offshore, the lighthouse long served as a beacon for mariners sailing one of the most treacherous stretches of the Atlantic. Shoals, probably associated in origin with the tidal currents that sweep in and out of the inlet, took a heavy toll of shipping before modern navigational aids appeared. The records, which are known to be incomplete, reveal that in the 40 years following 1838 no less than 125 vessels foundered in the 24-mile stretch north of Barnegat—more than five casualties to the mile.

The first lighthouse, a white-washed brick structure 50 feet high, was erected in the dunes and at some distance from the water in 1834 at a cost of $6000. Its beacon, the fourth placed on the New Jersey coast, was white and nonflashing and was made by burning whale oil. The restless and unpredictable ocean swept inland in 1856 and toppled the tower. A temporary replacement was put up until plans for a new building, hastily drawn by the Government, could be executed. The latter structure, the one now standing, was begun in 1857 and completed in 1858. The work was in charge of Lt. George Gordon Meade, who later distinguished himself at the Battle of Gettysburg. Also concerned with it was Francis Hopkinson Smith, who started out as an engineer and became a well-known writer. He was only twenty years old when at Barnegat, where he produced one of his earliest books, *The Tides of Barnegat.* Later on he constructed the Race Rock Lighthouse off New London, Conn., and the foundation for the Statue of Liberty in New York Harbor. In 1889 a $12,000 home for the lightkeeper was erected a short distance from the lighthouse, but it was destroyed by the sea a few years later.

The Barnegat tower is plain but handsome. It is recorded that "its builders used every device and material then known to science to secure a good foundation," and time has proved that they were successful. Sheet-metal piling now protects its base from the rushing currents that sweep through the channel only a few feet away, and on the seaward side there are a few yards of pile-backed wooden sheeting with rock fill behind it. Although winter storms (northeasters seem to be more damaging than hurricanes) make surprising changes well-nigh annually in the conformation of the coast line just south of the channel, they have so far left the old monument unscathed.

The gently tapering tower, circular except for a small structure at the entrance on the east side, rises from a beveled granite coping at ground level. The red brick wall is 10 feet thick at the base, vertical on the inside and has a slight batter on the outside that reduces the thickness to 18 inches at the top. In the center of the hollow shaft is a heavy iron pipe that runs from the bottom to the platform below the light itself. Around this column spirals an iron stairway. At four places, all at different elevations, are small windows, each looking out toward one of the main points of the compass. Just below the light, a door opens out onto a narrow encircling platform with a low metal fence around it. Above this is a few more feet of brickwork and then the wall becomes thick glass protected on the outside by iron grating. The latter was removed and taken to the ground for cleaning and repainting. The roof is of sheet metal.

The prisms that intensified the light to make it visible far out at sea were in the form of a cylindrical crown 8 feet in diameter and 15 feet high. It was made by Henri LePaute of Paris and contained 1024 pieces of optical glass. The assembly weighed 5 tons, but was so delicately balanced that it could be rotated by finger pressure. Actually, it was operated by a 150-pound weight suspended from a 65-foot rope in the central pipe that supports the stairs and worked like the weight in a grandfather's clock. It had to be rewound every hour.

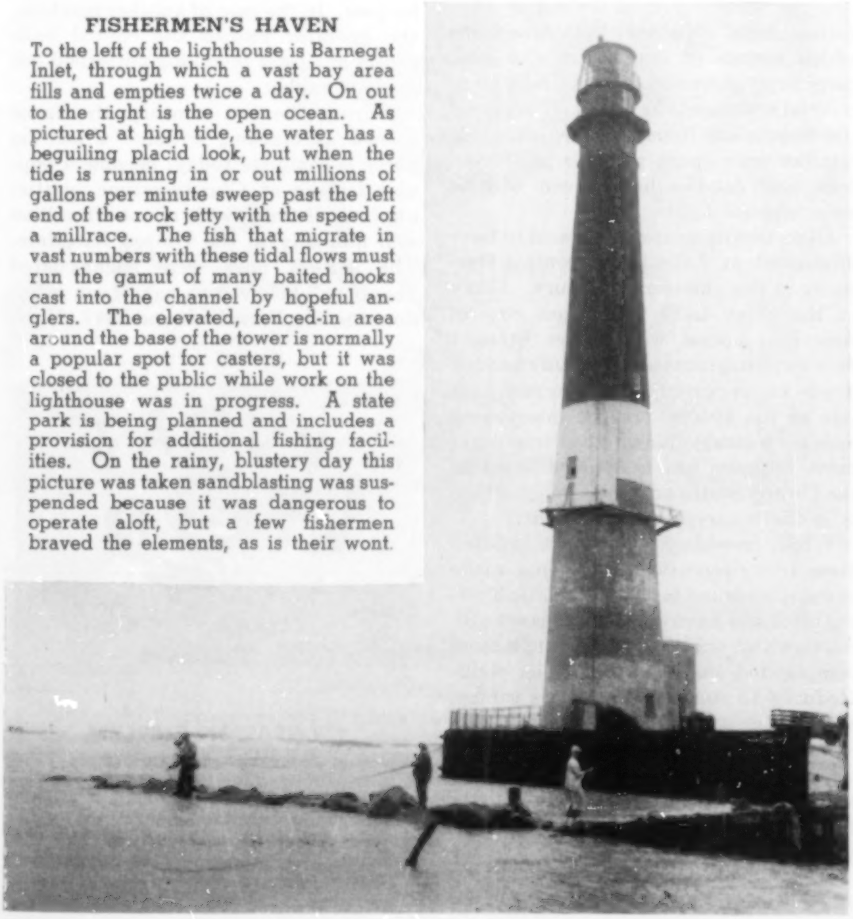
The beacon, of 16,000 candlepower, burned kerosene and had five circular wicks arranged concentrically, one within the other. The reservoir held 10 gallons, and the nightly oil consumption, which varied with the number of hours of darkness, ranged from 4 gallons in summer to 7½ in winter. The light flashed every 10 seconds. It had an accredited range of 19 to 20 miles, and some sailors said it could be seen from a masthead 30 miles away. It was beamed from the highest level of any in the country save that at Pensacola, Fla., which was one foot higher.

The light was operated without change for 69 years and never failed to function. Then, in 1927, a lightship was anchored offshore and assigned the duty so long performed by the tower. To the disapproval of the natives, who had grown genuinely fond of "Old Barney," the French-built lens crown was dismantled and shipped to Staten Island, N.Y., not for use but to be displayed as a relic of early lighthouse equipment. In its place was installed an 800-pound blinking light that burned acetylene gas stored under 225 psi pressure in drums at the base of the structure. A few weeks later electricity reached the island and the gas lamp was replaced by a 250-watt incandescent globe. Although it was 13 feet higher than the original kerosene beacon, it threw a much feebler beam that was visible for only 8 miles. However, the light continued to operate with this equipment until an August night in 1941 when it was turned out because German submarines were prowling off the coast. Since then it has never been relighted except for the county's 1950 celebration.

When the venerable but still serviceable light lost much of its usefulness, both because of the presence of the lightship and the fact that shipping was using lanes farther offshore, the Lighthouse Service wanted to raze the structure; in fact it had no authority to continue spending money to preserve and protect it from the ever-challenging sea. This proposal brought a storm of protest from the community, but there seemed to be no easy way for the government agency to change its mind. The problem was happily resolved when the Congress passed an act deeding "Old Barney" to the State of New Jersey, which was willing to take care of it.

The recent refurbishment was the first move in the development of a plan to create a state park at the lighthouse. Sand being dredged from Barnegat Inlet channel, which was nearly closed by a storm in November, 1953, will be used to fill in depressions between the dunes and provide a level area for parking automobiles. Attempts will be made to stabilize the sand by planting suitable vegetation, and walks will be built for the convenience of those who may wish to visit the tower and perhaps climb its stairway for a look around. The program also includes a picnic area and improved facilities around the base of the lighthouse for the convenience of fishermen, with whom the section is highly popular.

The park will take in twelve acres, which is about all of the adjacent state-owned land the sea has left after repeated encroachment. Its depredations can be gauged from the fact that the original lighthouse "compound" consisted of nearly 40 acres when Daniel Coxe gave it to the Government in the seventeenth century. When the adjoining village of Barnegat Light—then Barnegat City—was laid out, the streets were numbered from First on up. Now the lowest one is Third, the sections of First and Second that were available for building having been swallowed up in the meantime by the greedy Atlantic. The current program is in charge of the Office of Forests, Parks and Historic Sites, a Division of the Department of Conservation and Economic Development.

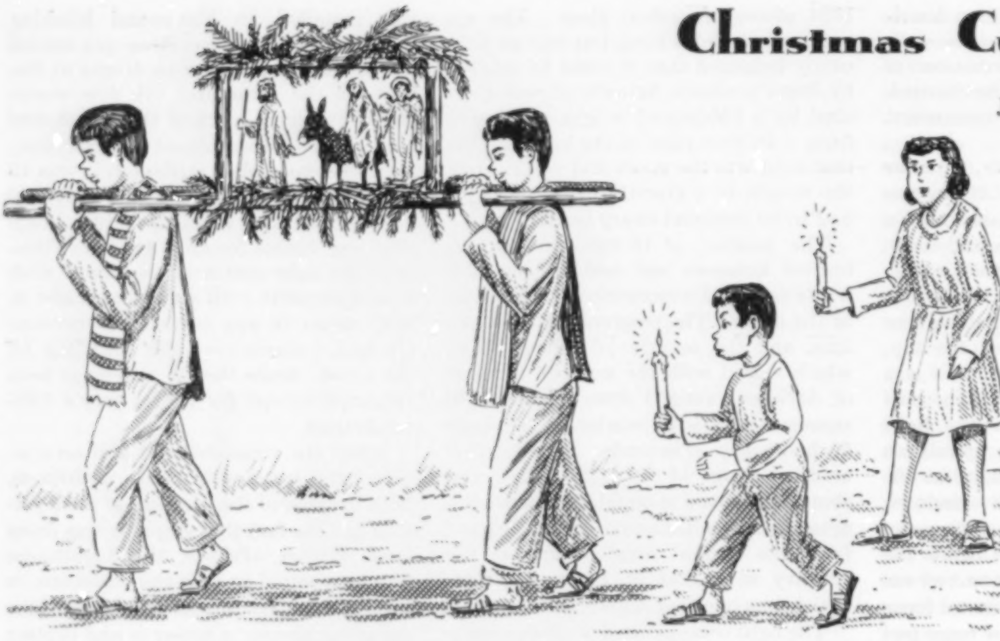


FISHERMEN'S HAVEN

To the left of the lighthouse is Barnegat Inlet, through which a vast bay area fills and empties twice a day. On out to the right is the open ocean. As pictured at high tide, the water has a beguiling placid look, but when the tide is running in or out millions of gallons per minute sweep past the left end of the rock jetty with the speed of a millrace. The fish that migrate in vast numbers with these tidal flows must run the gamut of many baited hooks cast into the channel by hopeful anglers. The elevated, fenced-in area around the base of the tower is normally a popular spot for casters, but it was closed to the public while work on the lighthouse was in progress. A state park is being planned and includes a provision for additional fishing facilities. On the rainy, blustery day this picture was taken sandblasting was suspended because it was dangerous to operate aloft, but a few fishermen braved the elements, as is their wont.

Christmas Customs

JANE S. MULLER



THE "POSADA" IN MEXICO

On each of the eight nights immediately preceding Christmas Eve, youngsters in Mexico carry out the ceremony of the *posada*, which means inn or lodging. The ritual commemorates the journey of Joseph and Mary from Nazareth to Bethlehem and their search for a place to sleep. A procession forms, led by two children carrying a litter on which are mounted figures representing Joseph leading the burro bearing Mary, with an angel walking behind. The procession stops at the designated house, a different one being chosen each night. After repeated entreaties for lodging and refusals voiced by the host in song, the door is opened to the visitors and there is laughter and rejoicing. The evening is spent in singing and dancing and concludes with the eagerly awaited breaking of the gift-laden *pinata*, which is illustrated below and on the following page.

THE Christmas season is essentially a family affair and most of the conventions and traditions reflect that fact. Some of the customs are common to all Christendom and others are purely local. In America, for instance, they are a combination of practices introduced by many peoples from many lands and cover a wide range from decorating trees to giving gifts, caroling at midnight, hanging stockings by the chimney, baking cookies and cooking family dinners.

The first lighted Christmas tree is attributed to Martin Luther, which would date it prior to 1546. He is said to have been so impressed by the wintry appearance of the countryside during a Christmas Eve walk that he, with the aid of his family, recreated the starry snow scene within his own home by means of a candlelit tree. On American soil, decorated evergreens were first recorded during the Revolution when Hessian soldiers, far from home, set them up in their quarters. And in the early days of this country they were most often seen where people of Teutonic origin had settled.

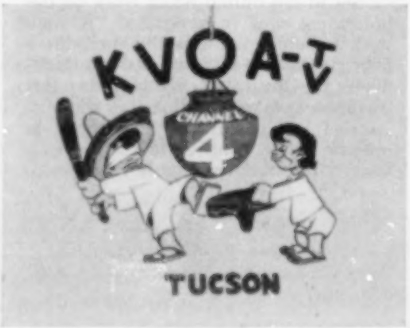
In sections of Europe where the Christmas tree is a holiday feature, conventional trimmings formerly included candles, gaily colored paper chains, nuts and apples covered with silver and gold foil, candy, cookies and snowy looking cotton tufts. To this list, Americans added strings of cranberries and popcorn, both white and colored. Now commercial ornaments have largely replaced the homemade items over which whole families once spent many happy evenings, and candles have given way to safer electric lights.

Glass tree decorations are said to have originated at Lauscha in central Germany in the nineteenth century. Many of the shiny balls used even now in American homes were either brought here by immigrants and carefully handed down or imported from Germany as late as the 1930's. In the intervening decades a sizable blown-glass tree-ornament business has been established in the United States and the foreign article is in the luxury class at present.

While free-blown and hand-painted glass tree decorations are being made in many sizes and forms, automatic blowing machines have greatly increased production and are turning out much more complicated shapes with heavier walls. Reduced to simple terms, glass tubing, mounted on a revolving fixture, is heated at one end, fed down into a split mold and expanded by a blast of compressed air. Upon removal from the mold, the product is flame-cut from the tube and is then ready for the finishing touches.

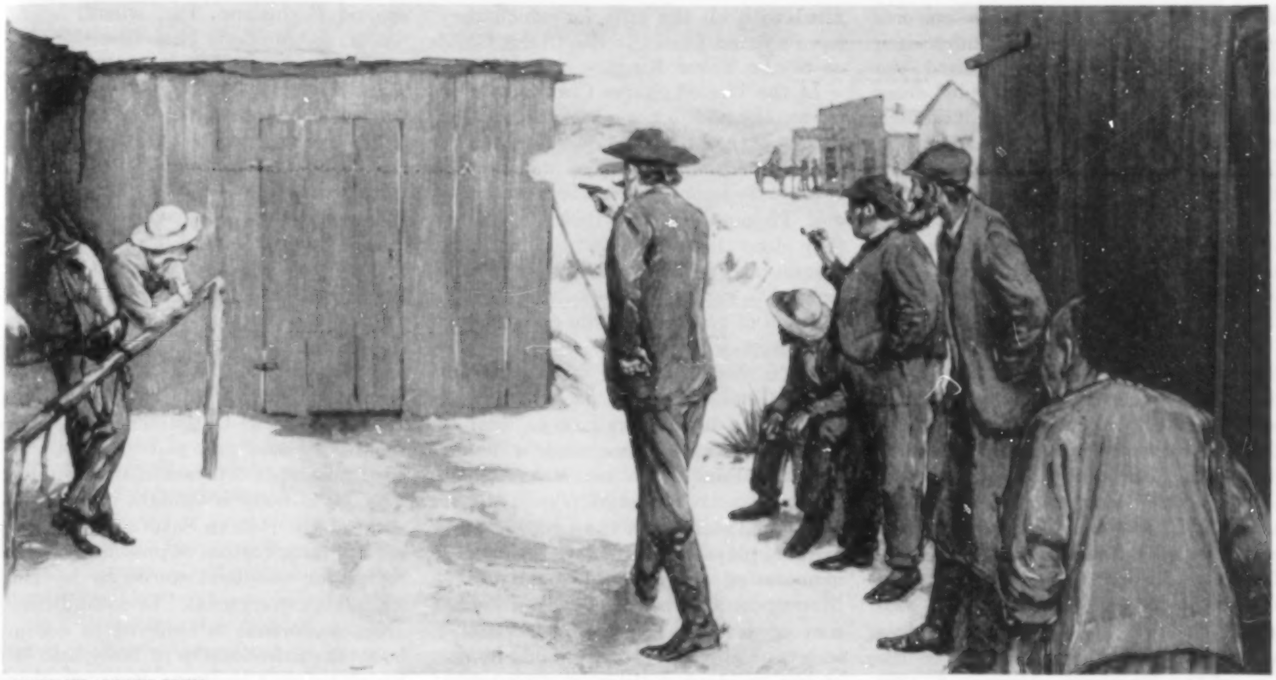
Most of the ornaments are given a silver wash on the inside for added luster and are then coated on the outside either with silver applied by a spray gun or with lacquer in twelve standard colors applied by dipping by hand or mechanical means. After drying in an oven, some are further decorated mostly by hand with water colors. Striping, however, is done by machine that carries the fragile articles into the path of a brush that automatically dips into the lacquer. In the case of another machine, the operator presses the coated balls gently against a revolving patterned roll made of rubber.

During the last century the favor known as cracker, without which no party is complete today, became a popular feature at Christmastime, particularly in Britain, with about 40 million sold annually in the United Kingdom. The earliest ones were sugar-coated "bonbons" believed to have been introduced by the French around 1847. How-



TV-STATION EMBLEM

During breaks in programs, some TV stations show VSI's (visual station identifications). These "trademarks" often depict interesting sidelights on the sections concerned. Station KVOA, at Tucson, Ariz., features this humorous treatment of the *pinata* that now enjoys year-round popularity



BETTMANN ARCHIVE PRINT

CHRISTMAS IN THE OLD WEST

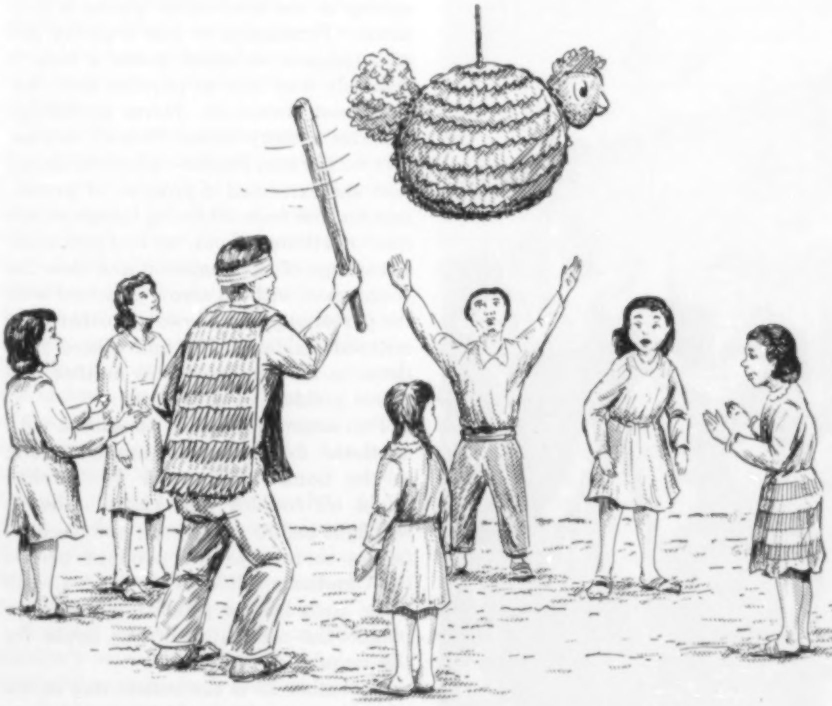
After partaking of a hearty dinner, the men in western mining camps were wont to demonstrate their shooting skill by using the wishbone of the festive bird for a target. This drawing by F. Newell appeared in a national magazine in 1891.

ever, a London baker is credited with converting it into a Christmas novelty. In 1848 he placed a printed motto in each paper wrapper, and two years later appeared the first bonbons with caps and prizes or charms inside.

The item really became a cracker a decade later when it was made to explode by simultaneously pulling on both ends of a long strip extending through it. The inventor of this noisemaker conceived the idea while listening to the crackle of burning logs. Imagining his cracker as log-shaped and crackling in a similar manner, he experimented for nearly two years to obtain the desired effect without risk of fire or injury to those handling it. Eventually, he hit upon a friction strip that did just what he wanted, and the cracker, then known as "Bang of Expectation," was well on its way to becoming one of Yuletide's noisiest trimmings.

Possibly one of the most colorful traditions in the New World is being perpetuated by the Mexicans not only at Christmastime but other holidays as well. It is the gay *pinata*—a fragile vessel in the shape of a familiar object such as a fish, star, shoe, house, animal, ship or person filled with sweetmeats and trinkets. At that holy season the *pinata* is the climax of a succession of nightly rituals marking the journey of Joseph and Mary from Nazareth to Bethlehem and their search for shelter. A procession led by two children bearing a litter winds through the streets followed by a group singing carols appropriate to the season. Many candles flicker in the dark as they go to the home chosen to be the *posada* or inn.

In song, the man of the house protests that there is not enough room inside, but finally allows the group to enter. After kneeling in prayer, the participants begin the gala part of the evening and the children compete in verse for gifts.



THE "PINATA"

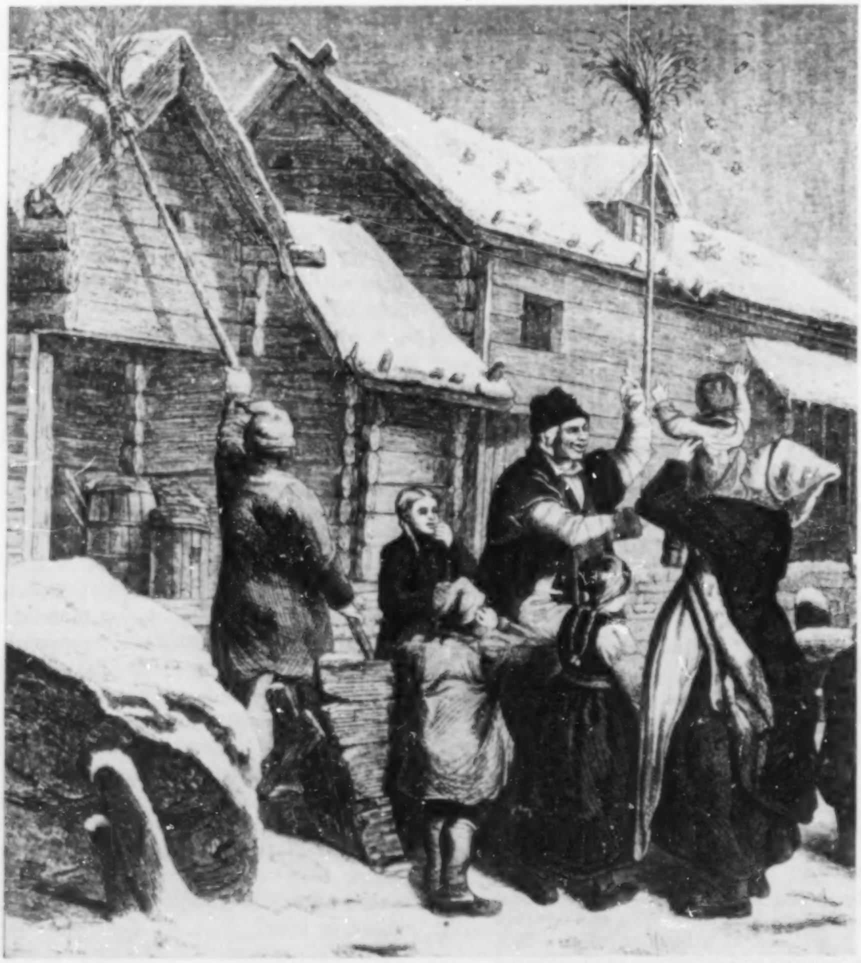
During the Christmas season Mexican shops and stalls feature the traditional *pinata*, an earthen jar filled with sweetmeats, toys and trivial gifts and covered with gaily colored papier-mache to give it the form of a familiar animal, fish, star, ship or person. In the home where the children and grownups have gathered for the *posada*, the *pinata* is hung from the ceiling, just out of reach. When the big moment arrives, a child is chosen, blindfolded and, after being whirled around several times, is given a stick with which to try to whack down the jar. If he or she fails after a fair trial, someone else takes over. When the *pinata* is finally broken, its contents are showered on the floor and a wild scramble for them follows.

Dancing, singing and refreshments precede the high point of the affair, when the young people gather around the *pinata* which has been suspended from the ceiling. One youngster is blindfolded and handed a stick with which to whack the clay container in an effort to break it and bring down a shower of presents. If he fails to do so in a short time another one receives the privilege, and so on until a successful blow finally shatters the *pinata*. A wild scramble ensues, and this ends the evening's festivities.

This event takes place on the eight nights preceding Christmas Eve. On the ninth, the occasion is surrounded with more solemnity because it marks the end of Mary and Joseph's search for lodgings and the birth of the Christ Child. A wild cacophony of shouts, bells and whistles announces the hour of midnight, which is followed by high mass. Then a traditional dinner is served with all the delicacies reserved for that season of the year. The celebration does not end there, however, for it is on the Eve of the Epiphany, January 6, that the children expect their shoes to be filled with all the gifts for which they have written letters to the Christ Child or to the Three Kings.

In the United States Christmas Day is the climax of a period of anticipation on the part of little children, especially. Visions of Santa Claus as depicted in word and picture by W. Clement Moore and Thomas Nast fill their dreams as they sleep through what to them is the longest night in the year. They have learned to know him as a jolly old fellow, the soul of generosity, who comes down the chimney in red and white splendor and fills their stockings with longed for goodies and toys. He used to have a long cotton beard, but now he wears a washable, combable one made of flameproof Du Pont nylon which has a high luster attractive to small fry.

In some sections of the United States caroling plays an important part in commemorating the feast of the nativity. Moravians long have followed the custom of tramping through the wintry streets on Christmas Eve singing hymns of joy or playing them on trombones. This is particularly true in the area around Bethlehem, Pa., where, legend has it, a trombone choir shortly after 1754, when that instrument was introduced there, saved the little community from an Indian attack. The group had climbed onto the belvedere of the Brethren's House at midnight to play traditional carols. When the redmen heard the music they believed it to be the voice of the Great Spirit and withdrew, leaving the small settlement to celebrate the holiday in peace.



BETTMANN ARCHIVE PRINT

EXORCISING EVIL SPIRITS

According to an old belief in some European countries green stalks and crops help to keep away evil spirits. This is the basis for the Norwegian custom of mounting bundles of oats on long sticks so that they can be waved over the roofs of the houses at Christmastime.

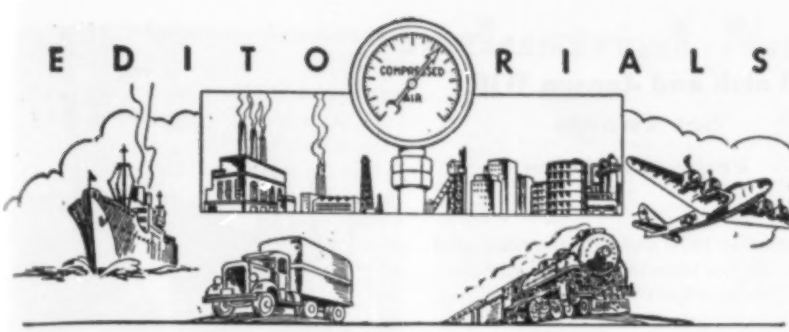
In the eastern part of the country the burning of the greens takes place any time between New Year's Day and Twelfth Night, while middle westerners dismantle their Christmas trees, trim them with suet and place them in the yard for the delectation of winter birds. The use of holly is thought to be a survival of the Roman Saturnalia or of an old Teutonic custom of providing winter refuge for woodland spirits by hanging walls with evergreens. In some British areas misfortune is believed to accompany the introduction of holly into the house before Christmas Eve; in others it is said that the person who brings in the holly will be master of the house; while in still other places the presence or absence of thorns on the branches indicates whether the husband or wife will control the family's destiny during the coming year.

Possibly one of the most action inspiring of the traditional greens is mistletoe. Permission to kiss a pretty girl who happens to stand under a twig is probably why it is so popular now, but it was not always so. Norse mythology includes a story about Freya's intense love for her son, Balder—a love so strong that she extracted a promise of protection for him from all living things except one—mistletoe. Loki, an evil god, took advantage of this omission and slew the young man with an arrow poisoned with the parasitic plant. However, other gods restored Balder to life and placed mistletoe in the keeping of his mother, the Norse goddess of love.

Two superstitions are associated with mistletoe: first, unless the branches hung in the home are burned by Twelfth Night all couples who kissed under it will fight before year's end; and, second, failure to remove the pendant berries by Candlemas Eve, February 1, will cause each leaf to produce a goblin to plague the occupants of the house for the remainder of the year.

December 25 is the holiest day in the Christian calendar, and today, as always, worshippers everywhere gather together to commemorate the birth of Jesus. While some of the customs peculiar to that festive season of the year are of secular origin, most of them, however, have religious significance that dates back to the day when the Star of Bethlehem led the three Wise Men bearing gifts to the Christ Child.

EDITORIALS



NECESSITY'S OFFSPRING

ARE we Americans too creative for our own good? The answer, of course, is in the negative, although our inclination to think up new things or new ways of doing something is so pronounced that it has produced a knotty problem for the Patent Office in Washington. James C. Worthy, Assistant Secretary of Commerce, revealed recently that there is a backlog of 205,000 patent applications awaiting processing, and it is piling higher all the while. If you were to apply for a patent today, you wouldn't get a definite decision on it until about May, 1958.

This jam hurts the little fellow more than the big one. Large, well-financed concerns can afford to wait or put a new idea into production before a patent is granted, but the private individuals or small businesses cannot. An independent inventor usually can't sell his brain child or obtain financial backing to manufacture it until he has his patent in hand.

The vexing part of the matter is that it is growing progressively worse. From 1790, when our patent system was established, until 1836, only 10,000 patents were issued. Since 1836, however, more than 2,700,000 have been granted, and others are following at the rate of about 40,000 per annum. As the number increases, and as the country's technical literature grows more voluminous and the technology more complex, the work of the patent examiner becomes steadily more burdensome because he has just that much more material to wade through in making his search. As a result, today's average examiner takes final action on about 100 applications a year, whereas his predecessor of half a century ago handled 235.

Putting more examiners on the job wouldn't solve the difficulty. Actually, it would accentuate it because it would accelerate the rate of issuing new patents and, by rapidly adding to the number of documents to be examined, would still further slow down the working pace of the staff. The situation would be like that of a man who is trying to dig his way out of a hole but continually digs in deeper.

But the outlook is not so dark as it would appear to be from the foregoing remarks. About the time the Patent Office people were starting to feel a little hopeless about the matter, the cause of all their worries—good old Yankee ingenuity—came to the rescue. It asserted itself through another branch of the Department of Commerce, the National Bureau of Standards. Recognized as one of the nation's top scientific agencies, the bureau has for some years pioneered in the development of electronic computers and data-processing machines. These efforts have reached a point where it looks as though the creation of a workable electronic patent-record searcher is possible.

Fundamentally, the computer's job will be that of coding and storing a tremendous amount of data in such a way that they could be scanned quickly and the desired items identified. The immediate, pressing problem confronting the designers of the machine is that of selecting from among several optional systems the one that seems to have the best prospects of initial success and is also so flexible that it can be adapted to meet future needs. To help in making the right choice, the bureau has enlisted the services of a group of outstanding technologists that is headed by Dr. Vannevar Bush.

TIDAL-POWER SCHEMES

ONE of the engineering profession's most fascinating schemes—the generation of power from the tides—is to be tried out in France. The big power company Electricité de France has started preliminary construction on a tidal plant on the Rance Estuary between Dinard and St. Malo in Brittany. It is planned to let the estuary fill at high tide to a depth of 37 feet, with the incoming water running over idle submerged turbines. Then, when the tide turns, the outflow will spin the turbines and produce electricity. It is estimated that production will total 550 million kilowatt-hours per year.

This news brings back memories of the ill-fated Passamaquoddy scheme for the development of tidal power launched near Eastport, Me., in 1935-36. It was sponsored by President Franklin D. Roosevelt, who had a summer home in the area, and was to follow plans formulated some years before by Dexter P. Cooper, his engineer neighbor on Campobello Island. Considerable preparatory work, most of it exploratory, was done and a modern village, complete even to a central heating plant, was built to house the 3000 workers who were expected to carry on with the project. However, an unsympathetic Congress nipped the budding scheme by withholding sustaining appropriations. The village housed some of the activities of the National Youth Administration for a time and then passed into private ownership.

The 'Quoddy project was, of course, highly visionary, but nevertheless might have opened the door to entirely new conceptions of power generation if it had been carried to conclusion. Even Capt. R. B. Lord, the young Army engineer who was in charge of the brief operations, admitted privately that he wasn't sure the scheme would prove to be practical, but had considered it of such paramount interest that he had asked for a part in it as soon as he heard about it.

Early this year it seemed as though the idea might be revived, and this may yet come to pass. To take advantage of the full potentialities inherent in the physical conditions at the site, the cooperation of Canada would be necessary, as Passamaquoddy Bay is in Canada. Our northern neighbor declined to participate twenty years ago, and the work that was abandoned then was confined to the smaller Cobscook Bay, which is wholly in the United States. The tidal range in that area is from 9 to 26 feet, although farther north, at the head of the Bay of Fundy, it is as great as 62 feet.

Since the eleventh century, in Great Britain and more recently in New England and along the coast line of South America, tidal flow has at times been harnessed to operate grist mills. The usual procedure was to create an inland reservoir, fill it at high tide and let the water run out again at low tide through a channel in which a water wheel was installed. Because the old-style mill wheel would not function when submerged, the power of the incoming tide could not be utilized.

All the modern generating schemes that have been proposed are variations of one advanced in 1905 by Monsieur Decoeur, a French engineer. The principal shortcoming is that energy cannot be produced continuously unless costly auxiliary works are provided. On an intermittent basis, the generating period would start 50 minutes later on each succeeding day in conformity with the lunar-day tide schedule. Employees of industries that might depend entirely upon such a hydroelectric plant would, consequently, have a continually changing shift, and that would play hob with ordered living. Perhaps the French won't mind that.

Walsh and Jansen Will Get Awards From the Moles

THOMAS J. WALSH

CARL B. JANSEN

THOMAS J. Walsh, chairman of the board of directors of the Walsh Construction Company, and Carl B. Jansen, president of Dravo Corporation, will be the 1955 recipients of the awards given annually for "outstanding achievement in construction" by The Moles, a society of men engaged in the tunneling and heavy-construction industry. The award, considered high recognition of service to the nation's construction industry, is made annually to one member of the organization and one nonmember. Walsh is the member winner.

Walsh became president of the firm that bears his name upon the death of his father in 1916 and held the post until 1946. He has been board chairman since then. He was born in Davenport, Iowa, in 1886 and, after being graduated from St. Mary's (Kansas) College, spent the 1907 season as a catcher with the Chicago National League baseball team before forsaking the diamond for the construction business.

The Walsh Company is credited with having driven more tunnels than any other firm in the country, among them the Queens-Midtown in New York City. Currently, it is completing some 26 miles of tunnels under the Catskill Mountains to bring more water to New York. The firm was a member of the group that reared Grand Coulee Dam, was one of four contractors participating in the construction of the United Nations Secretariat Building in New York, helped build French air bases for the U.S. Army Air Corps and at present is constructing similar bases in Spain.

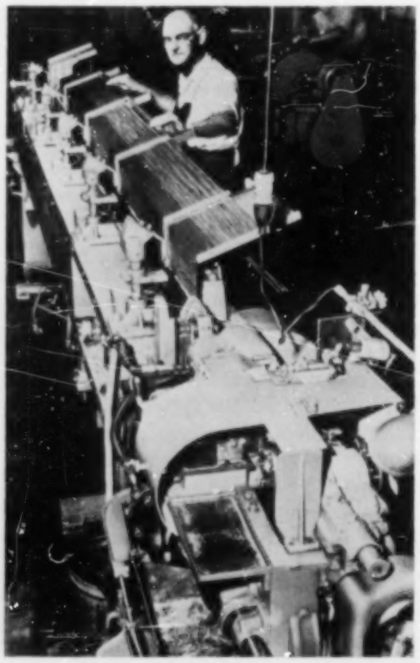
Jansen has been head of Dravo Corporation, with headquarters in Pittsburgh, Pa., since 1946. A native of Fonda, N.Y., he was graduated from Union College at Schenectady, N.Y., in 1922 and has been with Dravo ever since. He has had charge of many large projects, including the building of the substructures for the East Bay span of San Francisco Bay Bridge, Philadelphia subways, and a section of the Delaware River Aqueduct. During World War II Dravo constructed the twin shipways at Newport News which turned out some of the country's largest aircraft carriers.

When the awards are presented in New York next February 2, Walsh and Jansen will become the fifteenth pair to receive them. Previous winners included former President Herbert Hoover, Robert Moses, Admiral Ben Moreell and Gen. Brehon B. Somervell.

Air Feed Boosts Screw-Machine Output

THE rate of feeding steel rod to an automatic screw machine has been increased by 170 percent at the plant of Automatic Voting Machine Company, Jamestown, N.Y., by substituting a pneumatic system for manual handling. The operation involves the machining of door-hinge rods, $3\frac{17}{64}$ inches long, that are held to a tolerance of plus 0.009 and minus 0.003 inch.

The stock consists of steel rods $\frac{7}{32}$ inch in diameter and 10 or 12 feet long. These were formerly put in position, one at a time, to be gripped by mechanical fingers that fed them to the spindle and collet of a Brown & Sharpe automatic screw machine. With a machining cycle of $4\frac{1}{2}$ seconds per piece, it took approximately 3 minutes to feed a rod through the machine, and in order to keep it stocked the operator had to be there at the expiration of that interval. However, he also had to attend other machines and was occasionally delayed, at which times the screw machine ran idle. In addition, feeding by fingers was not entirely satisfactory. When too loose, they did not hold the rod firmly enough to insure cutting it into the proper lengths; and when too tight they scratched the surface of the stock.



NEEDS LITTLE ATTENTION

The operator is replenishing the supply of rods in the magazine, and that is all he has to do to the machine for about three hours, thus leaving him free to take care of other work.

To overcome these disadvantages the screw machine was equipped with a Lipe-Rollway bar feed, which is actuated by air valves and cylinders. Approximately 100 rods are racked in a magazine along one side of a split stock tube, the lower half of which slides backward to receive the bottom rod in the magazine. A stock pusher inside the tube moves the bar into the spindle and collet of the screw machine. The remaining piece after most of the rod has been fed through the machine is ejected by the succeeding one. This is accomplished by the following sequence of operations: the machine clutch disengages, stopping the tool cycle but allowing the spindle to revolve, the collet to remain open and the pusher to retract. The bar-feed cam actuates an air valve that automatically trips a device that permits just one rod to drop into the lower half of the open stock tube. The pusher then feeds the rod into the machine, ejects the remnant and initiates a new cycle.

As now equipped, the screw machine normally functions without attention until the magazine is empty. The operator is consequently free to devote more time to his other duties.

Industrial Notes

Plans have been made by the General Electric Company to place its pure tungsten and molybdenum products on the open market. These have heretofore been available only to a limited extent and consist of powder, rod, wire, rolled sheet and fabricated products. To find increasing uses for the metals the company is now building a $1,700,000 laboratory pilot plant at its Cleveland, Ohio, wire works.

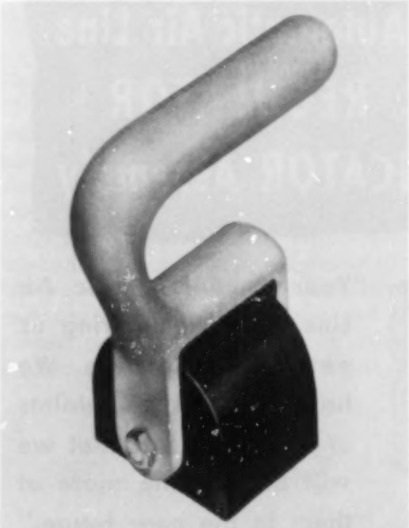
Circle 1E on reply card

To its line of high-power transistors, Minneapolis-Honeywell Regulator Company has added a germanium unit that is said to deliver up to 5 amperes of electrical current for a wide variety of uses such as operating motors and the output sections of high-power audio systems. Described as a super transistor, its capacity is attributed to a unique structure that permits rapid flow of heat to the outside of the unit from which it can be conducted in different ways, depending upon the application.

Circle 2E on reply card

Flat, nonporous, hard-to-pick-up or fragile materials and parts can be moved quickly, easily and safely with the Vac-Lift, a recent Ingersoll-Rand Company development. The unit is made up of an I-R Air-Bloc hoist, a pendent throttle and a specially designed vacuum cup. Its capacity may be increased by using additional cups. The operator only has to place the cup on the object to be shifted to create a tight seal. After the load has been moved, he releases it with finger-tip control. No vacuum pump or other special equipment is required because the air that actuates the hoist creates vacuum by aspiration. The Vac-Lift is suitable for handling TV tubes, metal sheets, plate glass, appliance housings, filing cabinets, boxes and numerous other products, many of which are now lifted and lowered by the aid of slings or hooks.

Circle 4E on reply card



MAGIC PICK-UP TOOL

That's the name of the device shown above, which is designed to handle ferrous sheet material that is hard on fingers and gloves. A product of Standard Portable Cord Company, Inc., the tool consists of an Alnico V magnet covered with Neoprene and is fastened securely to an aluminum handle. Units with a lifting capacity of 20, 30 and 45 pounds are available.

Circle 3E on reply card

For the detection of alpha radiation in clothing and working areas, engineers of General Electric Company have developed an instrument they call Alpha Poppy because it will often be used on equipment that gives warning "pops" when such rays are present. Normally they are harmless because they quickly dissipate their energy in the atmosphere; but they may be dangerous if a tiny bit of the source material becomes lodged inside the body. Gunlike in form, the nozzle of the tool is passed over suspected places. If they are contaminated, the rays will enter but ordinary light is kept out. The former are trapped in a zinc-sulphide screen, where they expend their energy by creating light. This is converted into electrical impulses that are magnified thousandfold to produce a visible or audible signal.

Rubber of a radically new kind was recently described at the National Meeting of the American Chemical Society. Produced by American Viscose Corporation and called Filastic, it consists of a web of small rubber fibers in random distribution bonded together at their points of contact. The web is formed by milling natural or synthetic rubber with conventional curing agents, dissolving the composition in a volatile solvent such as naphtha, and extruding the solution into the center of a rapidly moving column of air. The latter disrupts the stream of rubber into numerous fibers which are blown upward into a chamber and deposited on a moving screen as a layer, which is then talcked and cured. The material is said to have high tensile strength, which permits it to be sewn, tacked, stapled and cut at the edges without causing a running tear. Among the industrial uses recommended for it are: innersoles for shoes, pads for carpets, elastic wearing apparel and bandages, bathing suits, and rainwear which is water repellent but capable of breathing. It is reported that the development work was done in the laboratories of Arthur D. Little, Inc.

Circle 5E on reply card

Insul-Attic is the trade name of a new insulating material put on the market by Abbeon Supply Company for industrial and domestic use. It is made of reinforced asbestos covered both sides with aluminum foil. Only about 0.023 inch thick, it can be easily tacked or stapled to walls and overhead studding as a protection against heat in summer and cold in winter. The material comes in rolls in 18- and 36-inch widths and in four types, depending upon the application.

Circle 6E on reply card

For pyrometer service, a large steel mill has recently installed twenty spring-driven reels that are designed to pay out and wind up electric cords and cables

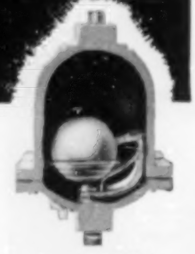
PRESSURIZED EXTINGUISHER

This American-LaFrance dry-chemical fire extinguisher, designed to smother gas, oil, grease or electrical fires, is charged with either compressed air or nitrogen at 150 psi pressure. A new Tenite nozzle fans the chemical out in a flat pattern to cover a wide area and, being transparent, reveals any chance obstruction that would affect the discharge.

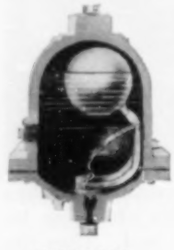
Circle 7E on reply card

ARMSTRONG *Snap-Action* AIR TRAPS

Assure Wide Open— Tight Shut Operation



TRAP CLOSED



TRAP OPEN

No. 71-315 is a forged steel trap having the same mechanism as the No. 71, but is designed for pressures up to 1000 psi.

Positive action, no dribbling, no hunting, no air loss—these are the advantages of the Armstrong "snap-action" ball float trap with spring-powered valve. The trap opens wide with a snap. *Before* all water leaves trap, valve snaps tightly closed. The valve is always water-sealed, preventing air loss. Fine dirt and grit won't interfere with operation.

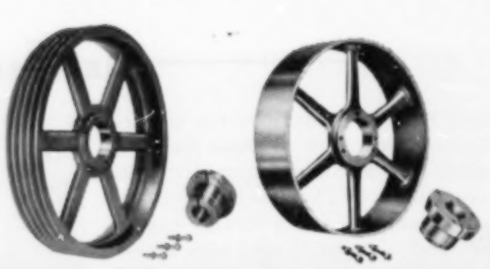
The flat strip spring of special Swedish steel lasts for years in ordinary service. Valve and seat are hardened chrome steel. All other internal parts are stainless steel.

Where heavy oil is encountered in lines, use inverted bucket traps. Ask for Bulletin 2022, describing both types. Call your local Armstrong Representative, or write

ARMSTRONG MACHINE WORKS
885 Maple St., Three Rivers, Mich.

ARMSTRONG *Snap-Action* AIR TRAPS

Circle 17A on reply card



a good, reliable source of supply for Sheaves-Pulleys

We have modern and adequate equipment to supply promptly any sheave or pulley requirements you may have . . . whether they be of solid construction or completely split. No matter what outside diameter, pitch diameter, face width or number of grooves you want, we probably have it in stock, but if not, we'll make it for you promptly. Contact your nearest Wood's Industrial Distributor or write us for specific information.

Wood's sheaves and pulleys can be ordered with our famous "Sure-Grip" interchangeable bushings for quicker mounting and easier removal.

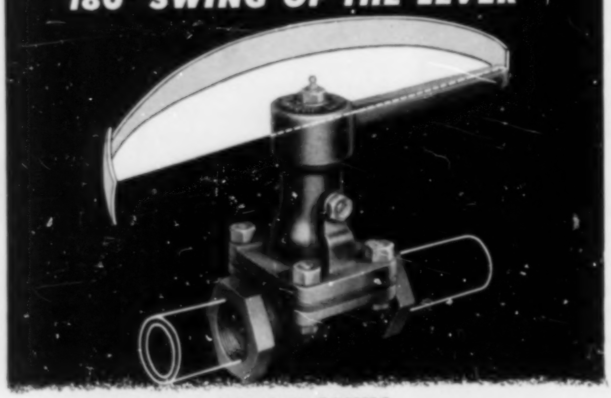
T. B. Wood's SONS COMPANY
CHAMBERSBURG, PA.
Mechanical Power Transmission Manufacturers—Since 1857.

CAMBRIDGE, MASS. • NEWARK, N. J. • DALLAS, TEXAS • CLEVELAND, O.

Circle 18A on reply card

with this corrosion resistant valve . . .

YOU GO FROM FULL OPEN TO FULL CLOSED IN A 180° SWING OF THE LEVER



HILLS-McCANNA
Quick Opening
SAUNDERS PATENT DIAPHRAGM VALVES

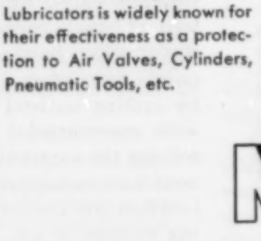
Dependent upon materials and size, Hill-McCanna Saunders Patent Valves are suitable for temperatures to 400°F., pressures to 150 psi. Write for descriptive literature.

HILLS-McCANNA
Saunders Patent
diaphragm valves
HILLS-McCANNA COMPANY, 2361 Nelson Avenue, Chicago 18, Ill.

Circle 19A on reply card

Prominent User Acclaims

"M-B" Automatic Air Line FILTER, REGULATOR and LUBRICATOR Assembly



The value of "M-B" Automatic Air Line Filters, Regulators and Lubricators is widely known for their effectiveness as a protection to Air Valves, Cylinders, Pneumatic Tools, etc.

"Your 'Sentinel of the Air Line' has been giving us very good service. We have had no complaints at all and I trust that we will be ordering more of them in the near future."

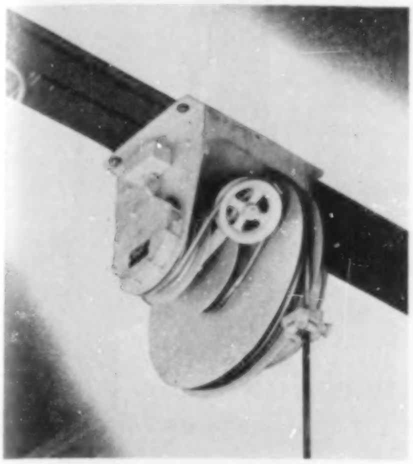
***signed:* A. E. Cranston, Sr.**
PRESIDENT

Cranston Steel Strapping Co.
Oak Grove, Oregon

M-B PRODUCTS
46 Victor Ave.
DETROIT 3, MICHIGAN

Circle 20A on reply card

without twisting and danger of explosions. They are suspended near the hearths from overhead beams so pyrometer leads can be quickly pulled down



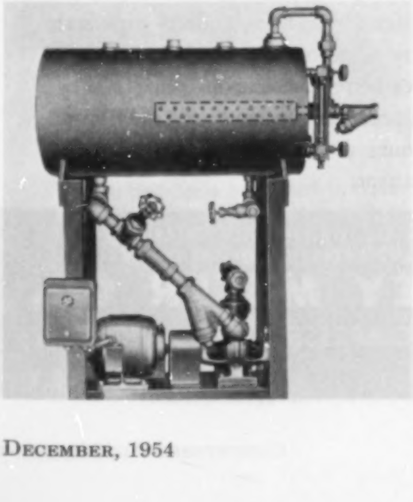
and held without tension while readings are taken. When released they wind up automatically, locking dogs providing window-shade action. Designated as Type WB Reels, they are manufactured by Gleason Reel Corporation.

Circle 8E on reply card

Conversions involving energy, linear, liquid or other factors are simplified, we are informed, by a new slide rule offered by Pickett & Eckel, Inc. With a single setting it automatically makes conversions without moving the slider or further computation.

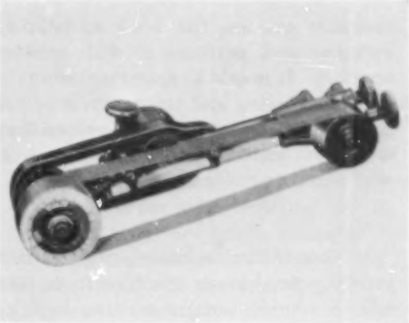
Circle 9E on reply card

A new boiler feed system which incorporates a preheater has been announced by Cyclotherm Division, United States Radiator Corporation. The unit consists of a perforated tube inserted horizontally in the feed-water tank and is connected to the steam supply. It is thermostatically regulated so that steam is introduced only when the temperature drops below a preset point. Then a flexible bellows, controlled by a thermostatic bulb, causes the preheater opening to vary or close. The unit can be used in connection with Cyclotherm or other makes of boilers and is said to lengthen their life by eliminating stresses that are apt to result when low-temperature feed water enters an already heated shell. Preheated make-up water also makes it easier for a boiler to maintain pressure during peak-load periods. The new system, with tanks ranging in size from 30 to 450 gallons, will supply feed water at 190-200°F at the rate of 280 to 2800 gallons per hour.



Circle 10E on reply card

Something new in belt grinders has been put on the market by B & E Manufacturing Company. Designated as Model 500 Contact Wheel Belt Grinder, it can be mounted at most any convenient place in a shop such as on a bench, a portable table or a pillar and adjusted vertically to any position where the

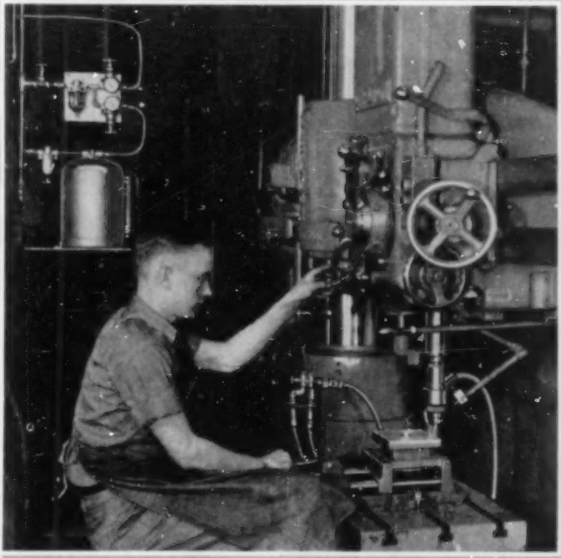


Norgren

Spray-Lube

System

ON RADIAL DRILL, TAPPING HOLES IN 1⅛" ALLOY STEEL *at O.K. Rubber, Inc.*



- **more than doubled tap life**
- **increased tap speed 38%**
- **improved quality of tapped hole**
- **eliminated the "mess" and excessive coolant cost of flood method**

and

- ***paid for itself in one month in machine cleaning time alone***

NORGREN SPRAY-LUBE SYSTEM

An Automatic, Air-Powered System for More Efficient Single or Multi-Point Application of Cutting Liquids to Metal Cutting and Forming Operations! For Tapping Machines, Drill Presses, Lathes, Milling Machines, Grinders, Stamping Presses, Boring Mills, Deep Draw Presses and Other Metal Working Machines.

WRITE FOR DETAILS IN NORGREN BLUEPRINT SL-3

C. A. Norgren® CO.
3407 So. Elati, Englewood, Colo.

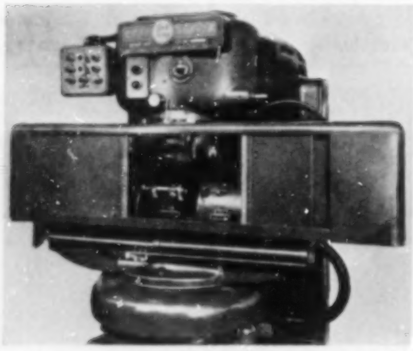
Circle 21A on reply card

operator can see the work to best advantage and perform it with greatest comfort. It is said to speed up deburring and chamfering and the removal of fins, parting lines or other projections from steel, cast-iron, bronze, aluminum, wood and plastic products being processed.

Circle 11E on reply card

By converting a standard Red Ring rotary gear shaving machine from manual to semiautomatic loading and unloading by means of an air-powered device it is possible to eliminate four of seven operator functions, according to the National Broach & Machine Company. By use of the equipment, it is necessary only to press a starter button after the gear is placed in mesh with the cutter and brought to rest on a special locator designed to meet the needs of the particular gear to be finished. Then a pneumatic cylinder closes the splash door, another advances the tailstock, the coolant begins to flow and the cutter to rotate. When the cycle is completed, the cutter motor stops, the coolant ceases to flow, the splash door opens and the tailstock retracts to permit unloading. Other advantages of the device are safety, because the operator's hands are kept out of the working area, and increased production.

Circle 12E on reply card



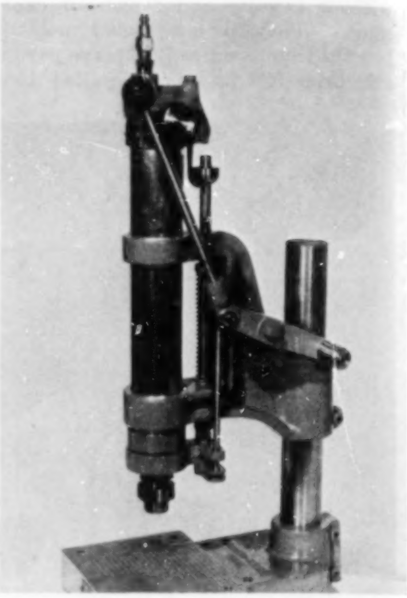
LOADER IN POSITION

The shaving machine pictured cuts the teeth on an automotive cluster gear shown resting on the locator. The long air cylinder which extends the width of the unit opens and closes the splash door of the working area. The cylinder that advances and retracts the tailstock is not visible.

A pneumatic relay that can multiply two different input pressures to provide a proportional outgoing pressure has been added to Minneapolis-Honeywell Regulator Company's line of pneumatic control-system components. It is known as the Tel-O-Set automatic ratio relay.

Circle 13E on reply card

As a companion to its Model 3-VS with a maximum pressure of 30,000 pounds, Heidrich-Nourse Company is offering the 2-CSB, an air hammer of simpler design with an impact range from zero to 7000 pounds. Of single stroke, it is lowered by a foot valve and moves in a closed cylinder with a surge chamber in the upper end. The force of the blow is adjusted by regulating the volume of the incoming air and is transmitted through the tool-holding chuck. When the tool has been brought in contact with the work, further slight pressure on the pedal opens the air valve and "triggers" the stroke. A hand lever may be used for the purpose. The impact is said to be



DRI AIR MAY BE INSTALLED BY SUSPENDING IT FROM THE PIPING WITHOUT ANY OTHER SUPPORT.

INCREASED PNEUMATIC EFFICIENCY WITH THIS AUTOMATIC SEPARATOR

PROTECT EQUIPMENT WITH

DRIAIR

SEPARATES • COLLECTS • DELIVERS

• DriAir separates and automatically ejects the condensed water and oil from compressed air lines, collects pipe scale and rust, delivers clean dry air to tools and other pneumatic equipment. This promotes better lubrication, reduces wear, increases life of tools and produces greater output. All internal parts are made of bronze or copper—resistant to corrosion and practically permanent.

A TYPICAL INSTALLATION SHOWING DRI AIR STANDING ON A CONCRETE FLOOR NEXT TO THE WALL.

WRITE FOR BULLETIN DA WHICH FULLY DESCRIBES THE CONSTRUCTION AND OPERATION OF THE DRIAIR.

NEW JERSEY METER CO.

"SPECIALISTS IN COMPRESSED AIR DEVICES"

PLAINFIELD, NEW JERSEY

Circle 22A on reply card

uniform regardless of material thickness. The new machine is suitable for staking, assembling, marking metal, shearing plastics and other similar services. The cylinder may be removed from the frame and used as a portable unit or mounted in fixtures.

Circle 14E on reply card

One of the country's largest steel mills has provided the control cockpits of the charging machines of its open-hearth furnaces with protective windows made of a new transparent resin designated as HT-CR-39. A product of Cast Optics Corporation, it is said to have strong impact resistance and to withstand exposure for a short duration to temperatures as high as 350°F with no loss in clarity or rigidity. It is available in sheets up to ½ inch thick for flat glazing.

Circle 15E on reply card

Patternmakers may be interested to learn that corisa lumber, native to South America, is now being distributed in the United States by The Kindt-Collins Company. Somewhat lighter but just as strong as pine and free from pitch, it is said to hold its shape better and to remain dimensionally stable under adverse conditions. The wood planes and sands easily with the grain or the end grain, carves well and takes coatings readily. It is available in varying thicknesses from 1 to 3 inches and is graded according to National Hardwood Association rules.

Circle 16E on reply card

STAYS PUT

It's a big help for a busy clerk in office or factory to have both hands free to riffle through papers and to write while telephoning. The holder shown here is resilient and is said to adjust itself automatically to all shoulder widths and slopes. Called Telehold it is made of black plastic with foam-rubber padding by the American Homecraft Company and snaps onto the instrument.

Circle 17E on reply card

QUOTES

—From Here and There

First Air-hose Couplings

The Eastman Manufacturing Company, Manitowoc, Wis., is celebrating its fortieth anniversary and in reviewing its progress through the years has reported the following among other interesting facts:

"In 1921 the first air hose couplings were made for rubber hose, known as Eastman Renewable Air Hose Couplings. Further application for this type of hose coupling was developed for use on automotive air brakes and in the lubrication field for automobile service stations.

"In 1921 the first experimental work was done on a reusable hose coupling for paint spray metal lined hose. At that time a patent application was made for this type of reusable hose coupling—including its use on air hose for service stations—which were then just beginning to appear! Because of high pressures used in automobile lubrication, Mr. J. Peter Eastman contacted the U. S. Rubber Company as early as 1926 to inquire if it were possible to manufacture hose using high tensile wire braid, in place of cotton braid, for reinforcement to increase the burst pressure.

"After considerable experimental work by the hose manufacturer and Eastman, a satisfactory ¼" inside diameter hose with a burst pressure of 3500 pounds per square inch was developed. This was considered high pressure at that time, when hand operated grease guns were used. Now that wire braid hose could be produced, a new coupling problem developed which required research and development by Eastman. By 1927 and 1928 a patent application was filed for the Eastman pressed-on hose coupling. This opened a new field because higher pressures could be used. Service stations were using motor driven greasing equipment with pressures as high as 10,000 pounds psi."

Sealing a Valley with Ice

"Australian engineers working on the Snowy Mountains hydro-electric project will install the biggest refrigerating system in the world to seal water in a deep valley.

"One side of the valley is rocky, but the other side is made up of glacial moraine. Engineers decided that in-

You dig Pay Dirt with SAUERMAN MACHINES

1½ cu. yd. Sauerman Slackline digs 100 tph. of soft lead ore.

because

2 cu. yd. Sauerman Scraper reclaims 90 tph. from zinc mine chat pile.

sand, gravel, ore or other bulk materials become pay dirt when the cost of handling is only a few cents per cubic yard. It takes only one man to operate a Sauerman Scraper or Slackline Cableway—reaching out 1,000 feet or more to dig, haul and dump—across pit, pond, river or stockpile, or up to the top of a hill . . . And Sauerman Equipment is low in first cost and economical to maintain.

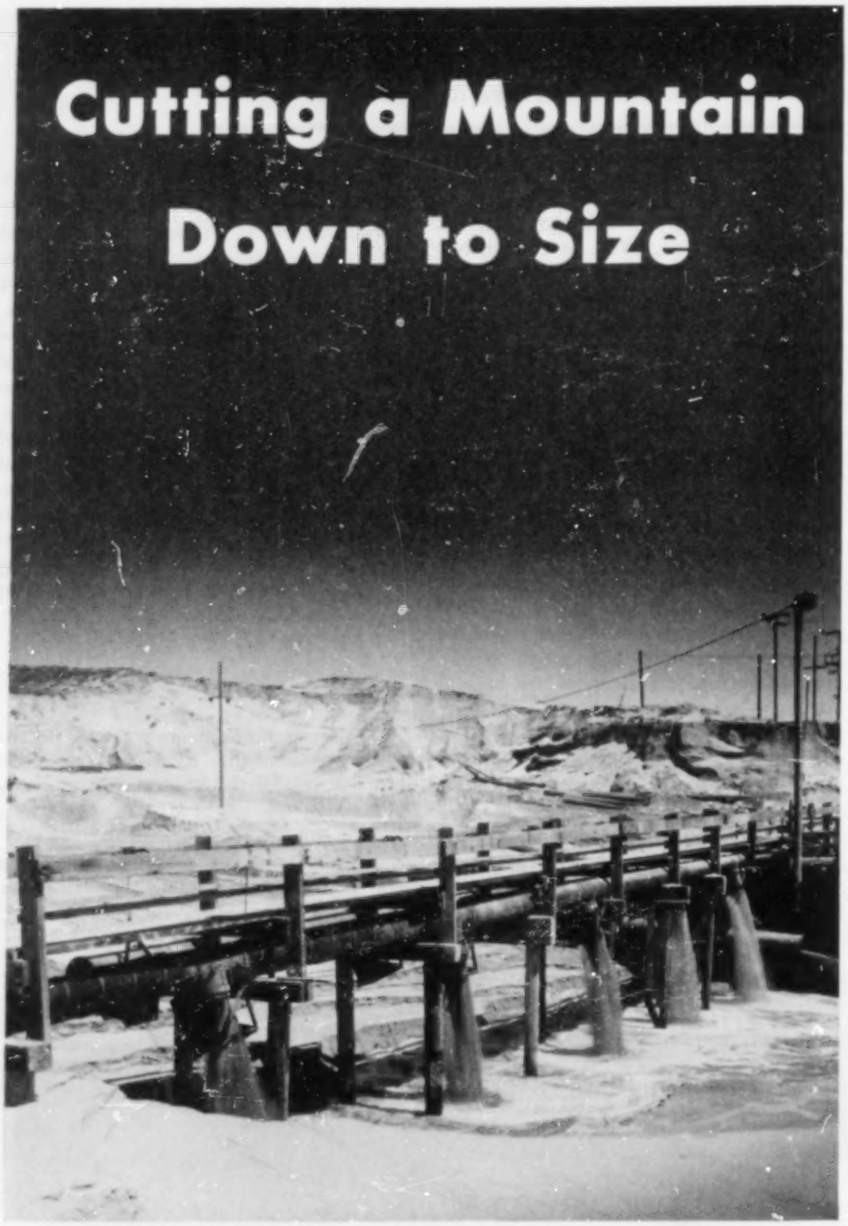
Write for Field Report 203 on the actual savings effected by Sauerman Equipment in an open pit mine.

OTHER INFORMATION:

Catalog A — Drag Scrapers
Catalog C — Slackline Cableways
Catalog E — Bulk Storage by Scraper

SAUERMAN BROS., Inc.
548 S. Clinton St., Chicago 7, Illinois

Circle 23A on reply card



It's no trick to move mountains when you have Naylor light-weight pipe to help you. This lockseamed-spiral-welded pipe is made to order for handling sand, gravel and water because it's stronger, leaktight and extra safe for this heavy-duty service. Naylor pipe is easy to handle and install, easy to move about as the job progresses — particularly with the one-piece Naylor Wedge-Lock coupling to speed connections. Write for Bulletin No. 507 on line pipe and Bulletin No. 513 on Naylor Wedge-Lock couplings.

NAYLOR PIPE

Naylor Pipe Company • 1245 East 92nd Street, Chicago 19, Illinois
Eastern U.S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

stead of sealing the moraine with concrete to prevent seepage—which would cost millions—they would use a wall of ice.

"A network of holes will be bored in the moraine, which is 500 ft deep and 900 ft wide. Tons of refrigerated brine will be dumped into these holes to freeze a solid wall beneath the surface. Once this is done it is hoped that additional brine will have to be pumped down only during the two summer months in the mountainous area."

Engineering News-Record
September 2, 1954

There's Gold in Them Thar Air Compressors!

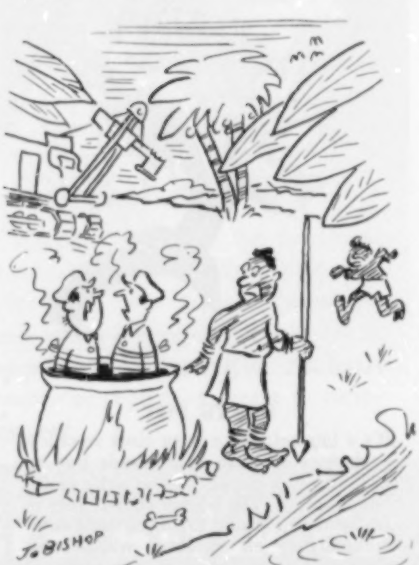
"One big shipyard found it—to the tune of $1000 per day. And in so doing they made an interesting point about modernization: sometimes modernizing wasteful methods and procedures is more important than replacing obsolete equipment.

"When a consultant cast a fresh eye over their big compressed-air system, he found, for example, that about $70,000 per year was being blown away by wasteful use, including compressed air for venting ships' holds.

"As simple a thing as undersized air hoses and fittings was reducing pressure at tools and cutting the work output an average of 30%. Figuring lost man-hours, this represented well over $100,000 annually.

"Jacking up the maintenance of compressors, air system and pneumatic tools added further savings, as did taking a long, hard look at actual labor requirements for operation."

Power, Mid-September, 1954



"I'm beginnin' to think these birds don't want a bridge."

Books and Industrial Literature

Air and Oil Cylinders in Industrial Applications is the first book to be published exclusively on the subject of fluid-power cylinders. It was written by Elmer F. Heiser, a practical man, and attempts to answer plainly some of the questions and problems that have been put to him in eighteen years of experience in working on cylinder design, selection and application. Profusely illustrated, the volume contains 21 chapters on cushion limitations and variations, operating speed, shock, air power-oil control, case histories, etc. Also included is an appendix of charts and tables and J.I.C. hydraulic and pneumatic component symbols. Published by The Industrial Publishing Company, 1240 Ontario Street, Cleveland 13, Ohio. Price, $5.00.

Thermodynamic advances made during a quarter of a century are incorporated in a new edition of *Principles of Engineering Thermodynamics* written by Paul J. Kiefer, Gilbert Ford Kinney and Milton C. Stuart. A 539-page book, it discusses convenient engineering methods for co-ordinating the thermodynamic properties of higher-pressure gases; shows the influences of chemical equilibrium in combustion processes; enters into modern techniques for thermodynamic analyses of high-velocity flow phenomena with compressible fluids in nozzle, diffuser, or duct; and supplements the familiar steady-flow energy equation by a parallel dynamics approach. Other pertinent data include analyses of gas-turbine cycles, the axial-flow compressor, air conditioning, and thermodynamic aspects of atmospheric phenomena. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price, $7.75.

Catalogue B54-9 describing Red Wing self-contained, air-powered bench-type broaching fixtures has been released by National Broach & Machine Company. Typical applications are discussed and illustrated.

Circle 18E on reply card

Actuators for the remote control of all types of wrench-operated plug valves from 1 to 8 inches are pictured and described in detail in a bulletin obtainable from Pantex Manufacturing Corporation.

Circle 19E on reply card

Standard Pressed Steel Company has prepared a 32-page catalogue that covers its line of Unbrako precision threaded fasteners. All items are pictured, and cut-away drawings show the special features of each.

Circle 20E on reply card

A comprehensive bulletin, No. 2225B, describes The Permutit Company's extensive line of pressure filters which are used to remove suspended impurities from water. Typical installation views are shown.

Circle 21E on reply card

Form PT654 prepared by Electronic Engineering Associates, Ltd., describes a miniature flush-diaphragm strain-gauge transducer for fluctuating pressure and for applications where small size and light weight are essential.

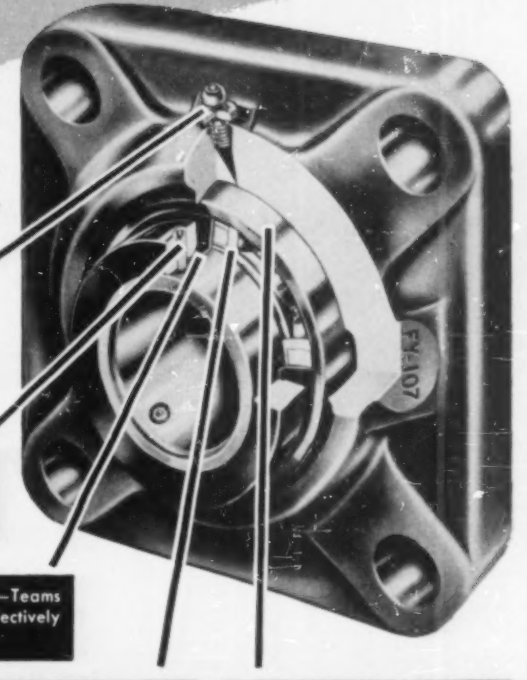
Circle 22E on reply card

Bulletin 050 prepared by Simplex Valve & Meter Company deals with control and measuring equipment for water and sewage works and power and processing industries. Included are descriptions of standard and elliptical Venturi tubes and parabolic flumes

Here's News! SKF's New "FY" Flanged Housing

with FIVE important features!

Here from SKF is the "FY" Unit Flanged Housing which incorporates many new design improvements. Ideally suited for applications where a pedestal support is not available, the "FY" is fully interchangeable with other mountings of its type.



ALEMITE FITTING—For easy lubrication.

EASY TO MOUNT—Just tighten two set screws.

ROTATING FLINGER—Teams with the Red Seal to effectively exclude dirt.

SKF RED SEAL—Made of DuPont "Fairprene" excludes dirt, acts as a flap valve to relieve the bearing of excess lubricant.

ALIGNING SINGLE ROW BALL BEARING—Spherical outer ring compensates for initial misalignment.

Available—from SKF Authorized Distributors everywhere.

YES—The SKF Ball Bearing Aligning Unit is also available separately, and in the "SY" Unit Pillow Block.

COMPLETE SPECIFICATIONS—sizes, dimensions, weights, availabilities, are given in Bulletin 370. Send for it today!

SKF®
BEARINGS AND PILLOW BLOCKS

SKF INDUSTRIES, INC.
Manufacturers of SKF and HESS-BRIGHT® bearings.
FRONT ST. AND ERIE AVE. PHILADELPHIA 32, PA.

Send Bulletin 370. I'm interested in "FY" for________

new equipment design________existing installation.

*Name*________*Title*________

*Company*________

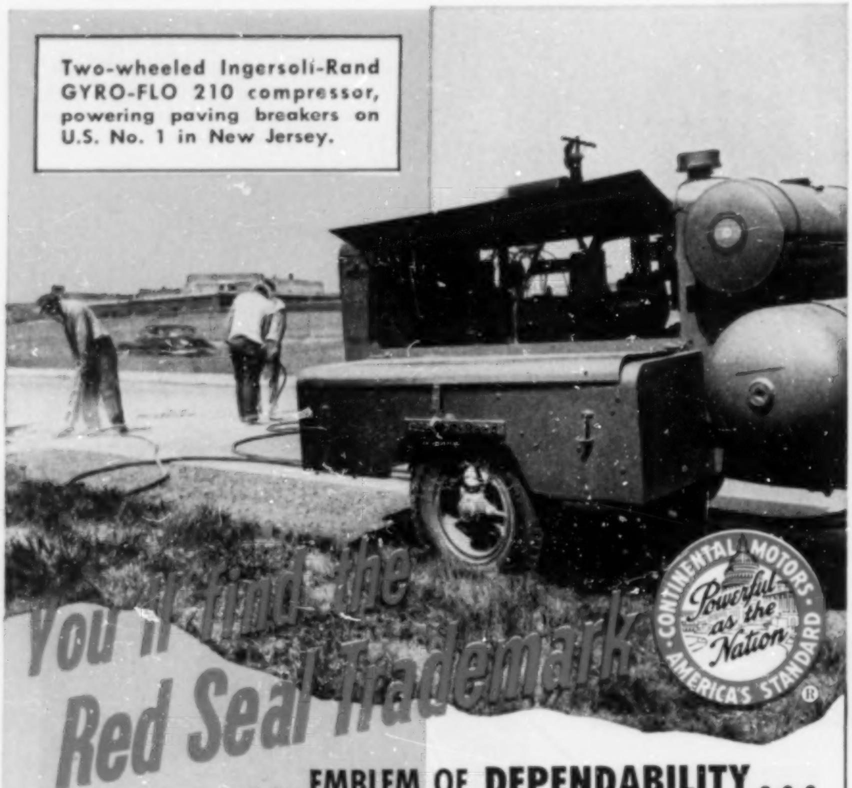
*City*________*Zone*________*State*________

*Type of plant*________

*Approximate number similar units in service*________

7553

Circle 25A on reply card



Two-wheeled Ingersoll-Rand GYRO-FLO 210 compressor, powering paving breakers on U.S. No. 1 in New Jersey.

... EMBLEM OF DEPENDABILITY ...

INDUSTRIAL GASOLINE ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N56	4	2¼	3½	56	14.2 @ 2200 RPM
N62	4	2⅜	3½	62	15 @ 2200 RPM
Y69	4	2½	3½	69	21.4 @ 2400 RPM
Y91	4	2⅞	3½	91	28.5 @ 2400 RPM
Y112	4	3 3/16	3½	112	32 @ 2400 RPM
F124	4	3	4⅜	124	36 @ 2400 RPM
F140	4	3 3/16	4⅜	140	42 @ 2400 RPM
F162	4	3 7/16	4⅜	162	49 @ 2400 RPM
F186	6	3	4⅜	186	60.5 @ 2400 RPM
*E201	4	3⅝	4⅞	201	59 @ 2000 RPM
F209	6	3 3/16	4⅜	209	68 @ 2400 RPM
F226	6	3 5/16	4⅜	226	73 @ 2400 RPM
F244	6	3 7/16	4⅜	244	79 @ 2400 RPM
M271	6	3⅝	4⅜	271	86.2 @ 2400 RPM
M290	6	3¾	4⅜	290	92.2 @ 2400 RPM
M330	6	4	4⅜	330	104.4 @ 2400 RPM
M363	6	4	4 13/16	363	109 @ 2000 RPM
B371	6	4⅛	4⅝	371	110 @ 2400 RPM
B427	6	4 5/16	4⅞	427	127 @ 2400 RPM
G134	4	3⅛	4⅜	134	32.2 @ 2000 RPM
G157	4	3⅜	4⅜	157	37.7 @ 2000 RPM
H227	4	3⅝	5½	227	52 @ 1800 RPM
H243	4	3¾	5½	243	56 @ 1800 RPM
*H260	4	3⅞	5½	260	60 @ 1800 RPM
T371	6	4⅛	4⅝	371	119 @ 2400 RPM
*J382	4	4½	6	382	74.2 @ 1400 RPM
T427	6	4 5/16	4⅞	427	140 @ 2400 RPM
U501	6	4½	5¼	501	160 @ 2400 RPM
R513	6	4½	5⅜	513	164.3 @ 2400 RPM
R572	6	4¾	5⅜	572	182.4 @ 2400 RPM
R602	6	4⅞	5⅜	602	191.7 @ 2400 RPM
S749	6	5⅜	5½	749	217 @ 2200 RPM
S820	6	5⅝	5½	820	237 @ 2200 RPM

INDUSTRIAL DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
GD157	4	3⅜	4⅜	157	39 @ 2000 RPM
*ED201	4	3⅝	4⅞	201	45.8 @ 2000 RPM
HD243	4	3¾	5½	243	54.7 @ 2000 RPM
*HD260	4	3⅞	5½	260	59.3 @ 2000 RPM
*JD382	4	4½	6	382	72.5 @ 1600 RPM
TD427	6	4 5/16	4⅞	427	106.5 @ 2000 RPM
RD572	6	4¾	5⅜	572	142.5 @ 2000 RPM
SD802	6	5 9/16	5½	802	202 @ 1800 RPM

*Available for industrial applications only.

ON THE ENGINE OF LEADING MAKES OF:

Pumps ... Compressors ... Shovels
Cement Mixers ... Graders
Earth Movers ... Ditchers ... Rollers
Well Drillers ... Paving Machines
Winches ... Hoists ... Conveyors
Industrial Trucks ... and other
Specialized Power Equipment

•

When choosing construction machinery, always remember that the leading makes of specialized equipment for every operation, from excavation on through final grading, offer the plus value of dependable Red Seal power. And Red Seal *means* plus value, because every model, no matter in what machine you find it, is engineered with the specific needs of that machine in mind. Red Seal industrial engines—14 to 237 horsepower—are backed by parts and service coast to coast. Look for the Red Seal Trademark on the engine of the equipment you choose.

• • •

6 EAST 45TH ST., NEW YORK 17, N. Y. • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 S. SANTA FE AVE., LOS ANGELES 58, CALIF. • 910 S. BOSTON ST., ROOM 1008, TULSA, OKLA. • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GA.

Continental Motors Corporation
MUSKEGON, MICHIGAN

Circle 26A on reply card

used as primary devices to actuate secondary indicating, recording and totalizing units, as well as of miscellaneous air-release and air-inlet (vacuum breaking) valves.

Circle 23E on reply card

Give the Cooling System A Chance is the title of Bulletin No. 19 published by the Service Division of Cummins Engine Company, Inc. It offers many practical suggestions on the care of internal-combustion engines to avoid costly repair bills.

Circle 24E on reply card

Self-molding packing and sealing compounds are discussed in a folder entitled *Did You Ever Meet Your Silent Partner?* Issued by Surveys, Inc., it emphasizes losses caused by unnecessary leaks and shows how they can be prevented.

Circle 25E on reply card

Good Operating Practices is the title of a 12-page brochure prepared by Johns-Manville for those responsible for the maintenance of plant buildings and equipment. It contains many suggestions that will help users to obtain maximum service from insulation, packing, refractory products, roofing and friction materials.

Circle 26E on reply card

Commercially pure titanium foil rolled to very close tolerances and thin gauges is described by its producer, American Silver Company, Inc., in Technical Bulletin No. 100. Data on welding, brazing, annealing and forming are included.

Circle 27E on reply card

More than 600 of the most widely used Compo oil-retaining porous bronze bearings are catalogued in Stock List No. 4 being distributed by Bound Brook Oil-less Bearing Company. The book also contains information on application, installation, lubrication and machining.

Circle 28E on reply card

Ledeen Manufacturing Company has released a 16-page bulletin, No. 1010, covering its complete line of standard 4-way hand-, foot-, power- and solenoid-operated valves, as well as a new type of pilot valve. Application and circuit diagrams are included and accessories are listed.

Circle 29E on reply card

An illustrated leaflet obtainable from D. C. Caufield Copy-Master describes a lightweight portable device that is designed to duplicate on any engine lathe intricate close-tolerance contours including curve into curve and curve into angle. The company provides engineering and template services upon request.

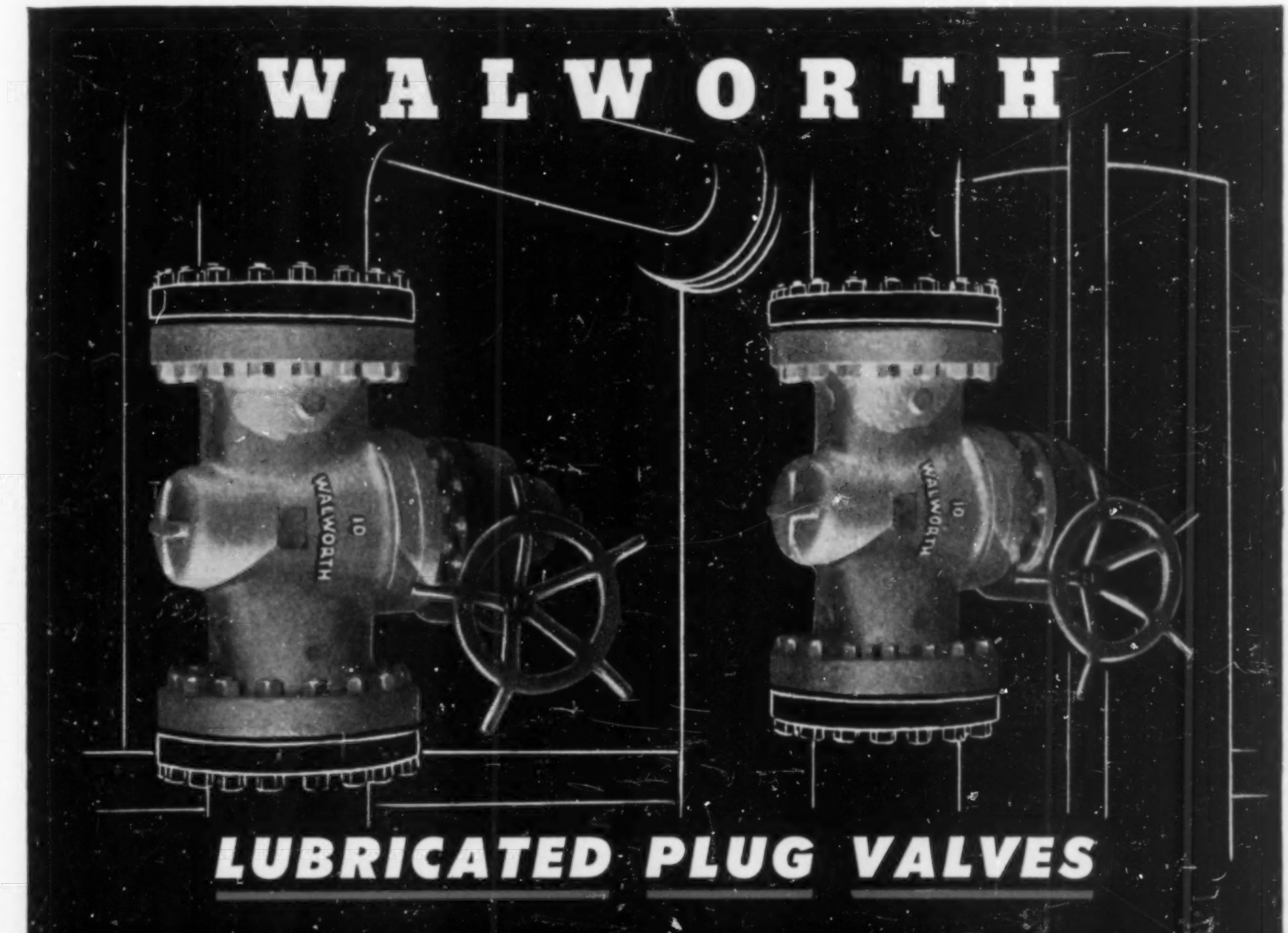
Circle 30E on reply card

The Sheffield Corporation is offering a new 30-page catalogue illustrating and describing its full line of column-type Precisionaires and accessories such as air spindles, air snaps, gauging units, master setting rings and disks widely used in measuring dimensions in receiving, process, final and toolroom inspection.

Circle 31E on reply card

Basic Refractories, Inc., has published *A Guide for Refractory Selection* mainly as a review of practical refractory problems and their solutions. The 12-page book discusses the characteristics and properties of various types of granular refractories, applications in open-hearth and electric steelmaking furnaces, as well as gunning and ramming techniques.

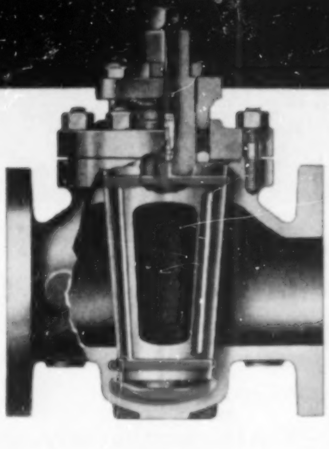
Circle 32E on reply card



WALWORTH

LUBRICATED PLUG VALVES

Better because . . . **They are *pressure sealed* with an insoluble lubricant readily renewed while the valve is in service. Lubricant completely surrounds the plug ports assuring a tight seal against leaks. It also insures ease of operation by reducing friction between the body and the plug while at the same time protecting the finished surfaces against corrosion and wear.**



Lubricant system of a Walworth No. 1700F Regular Gland, Wrench Operated, Steel-iron, *Lubricated Plug* Valve. Other Walworth *Lubricated Plug* Valves include Single Gland, and Ball Bearing types. Sizes to 30-inches — pressures to 5,000 psi, and for vacuum service.

Walworth Lubricated Plug Valves are the most satisfactory valves available for the handling of gritty suspensions, and many other destructive, erosive, and corrosive industrial and chemical solutions.

They are ideal for general refinery and pipeline service.

For full information see your Walworth Distributor, or write for your copy of Bulletin 111. Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

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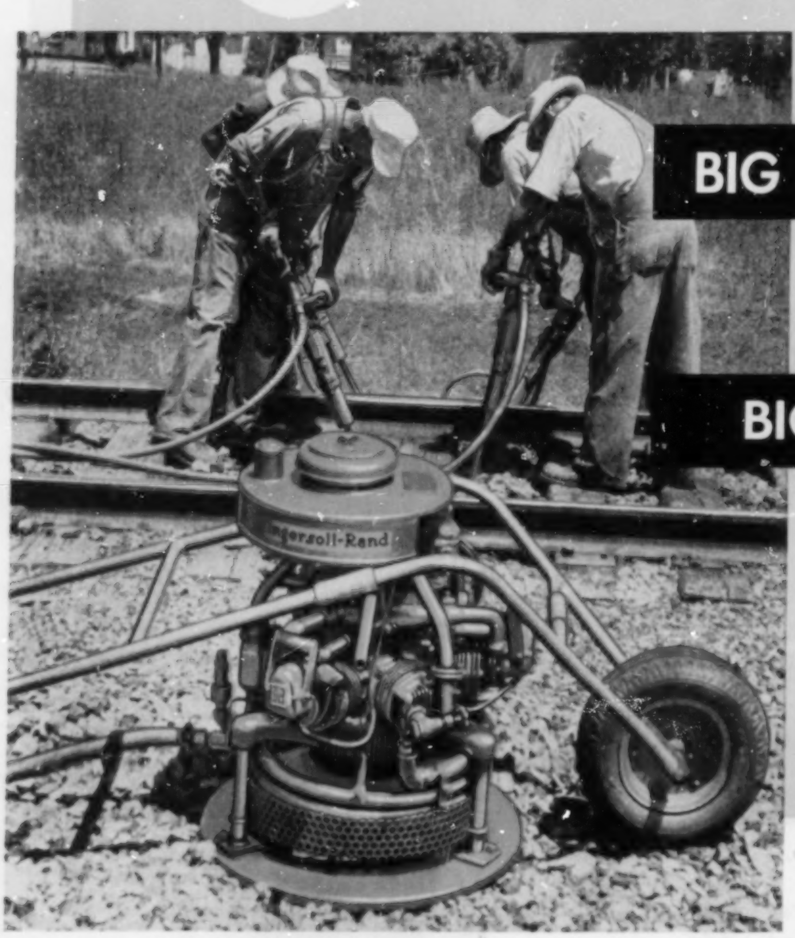
Circle 27A on reply card

SPOT-AIR

the little compressor that does a big job



BIG IN PERFORMANCE

Operates FOUR Ingersoll-Rand MT-4 Tampers

BIG IN ECONOMY

SAVES SPACE—only 32" high on a 27" base plate

SAVES LABOR—readily moved from one spot to another

SAVES UPKEEP—rugged construction, minimum maintenance

The SPOT-AIR, operating *four* MT-4 railroad tie tampers, delivers 36 cfm at 80 psi. With wheelbarrow mounting shown, one man can readily take it almost anywhere.

From its comparatively small size, you wouldn't suspect this compact SPOT-AIR Compressor could deliver so much air power so economically.

SPOT-AIR weighs only 265 lbs. It's a self-contained, single-stage, gasoline-powered compressor. Because it is completely air-cooled, you can use it in any kind of weather—without danger of freezing in winter—or overheating in summer.

With *four* I-R Type MT-4 Tampers, the 3R-36 SPOT-AIR makes a complete air-tamping team. You'll find it saves time and improves work in practically any job where air power is applicable. For further information, see your nearest Ingersoll-Rand representative.

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.

AIR TOOLS

Spike Drivers
Grinders
Impactools
Wire Brushes
Wood Borers
Riveting Hammers
Rivet Busters
Scaling Tools
Backfill Tampers
Paving Breakers
Pumps
Utility Hoists

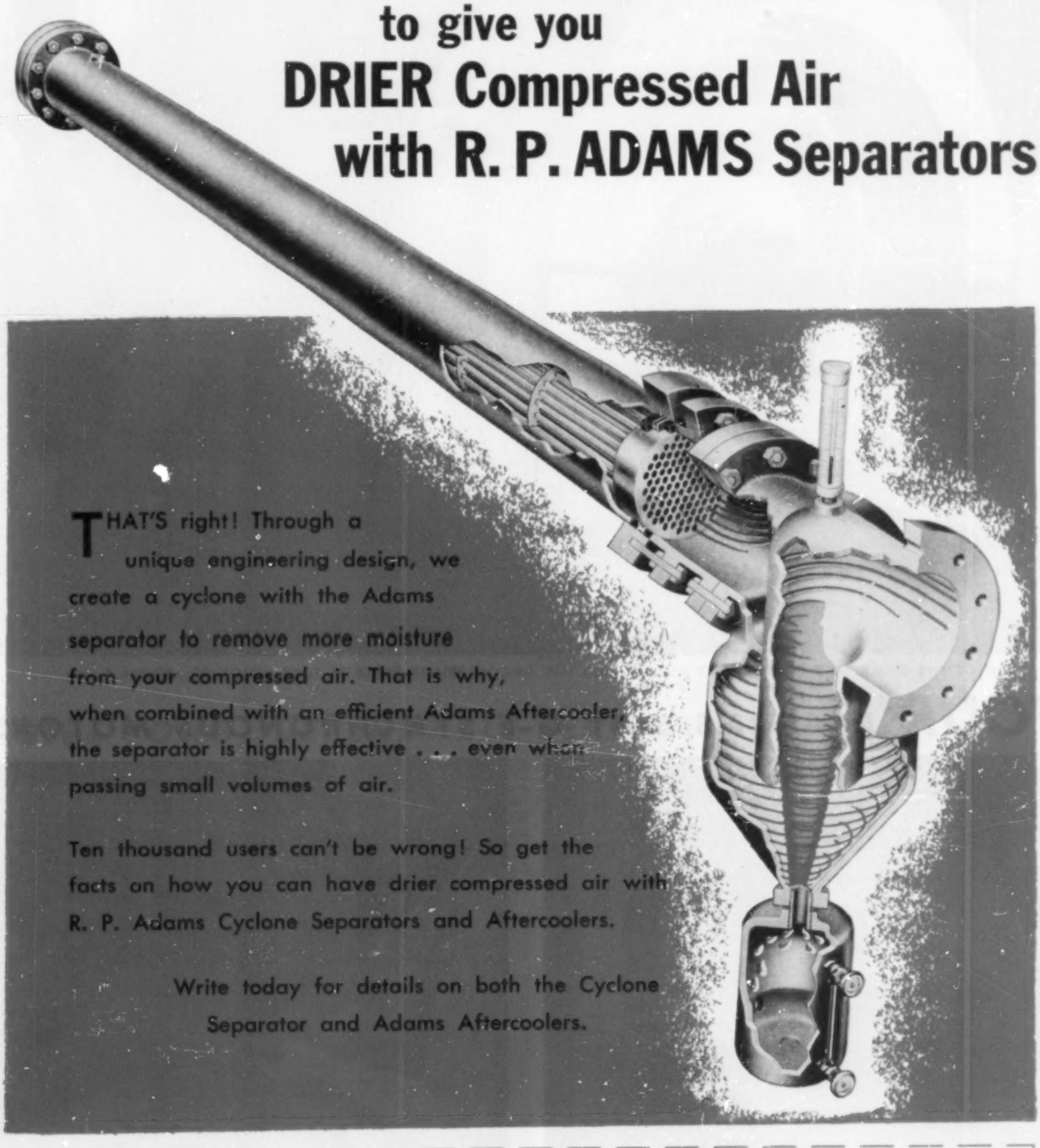
COMPLETE IR AIR POWER
TO MEET NEEDS OF ANY JOB

PORTABLE COMPRESSORS

A complete line in 36, 60, 85, 125, 210, 315, and 600 cfm sizes.

Circle 28A on reply card

We create a CYCLONE
to give you
DRIER Compressed Air
with R. P. ADAMS Separators



THAT'S right! Through a unique engineering design, we create a cyclone with the Adams separator to remove more moisture from your compressed air. That is why, when combined with an efficient Adams Aftercooler, the separator is highly effective . . . even when passing small volumes of air.

Ten thousand users can't be wrong! So get the facts on how you can have drier compressed air with R. P. Adams Cyclone Separators and Aftercoolers.

Write today for details on both the Cyclone Separator and Adams Aftercoolers.

R. P. ADAMS Co., Inc.
209 EAST PARK DRIVE
BUFFALO 17, N. Y.

R. P. ADAMS CO., INC.
2 East Park Drive
Buffalo 17, N. Y.

Please send my FREE copy of Bulletin #177 on Adams Cyclone Separators and Aftercoolers.

Name...Firm...

Street...City.....................State.....................

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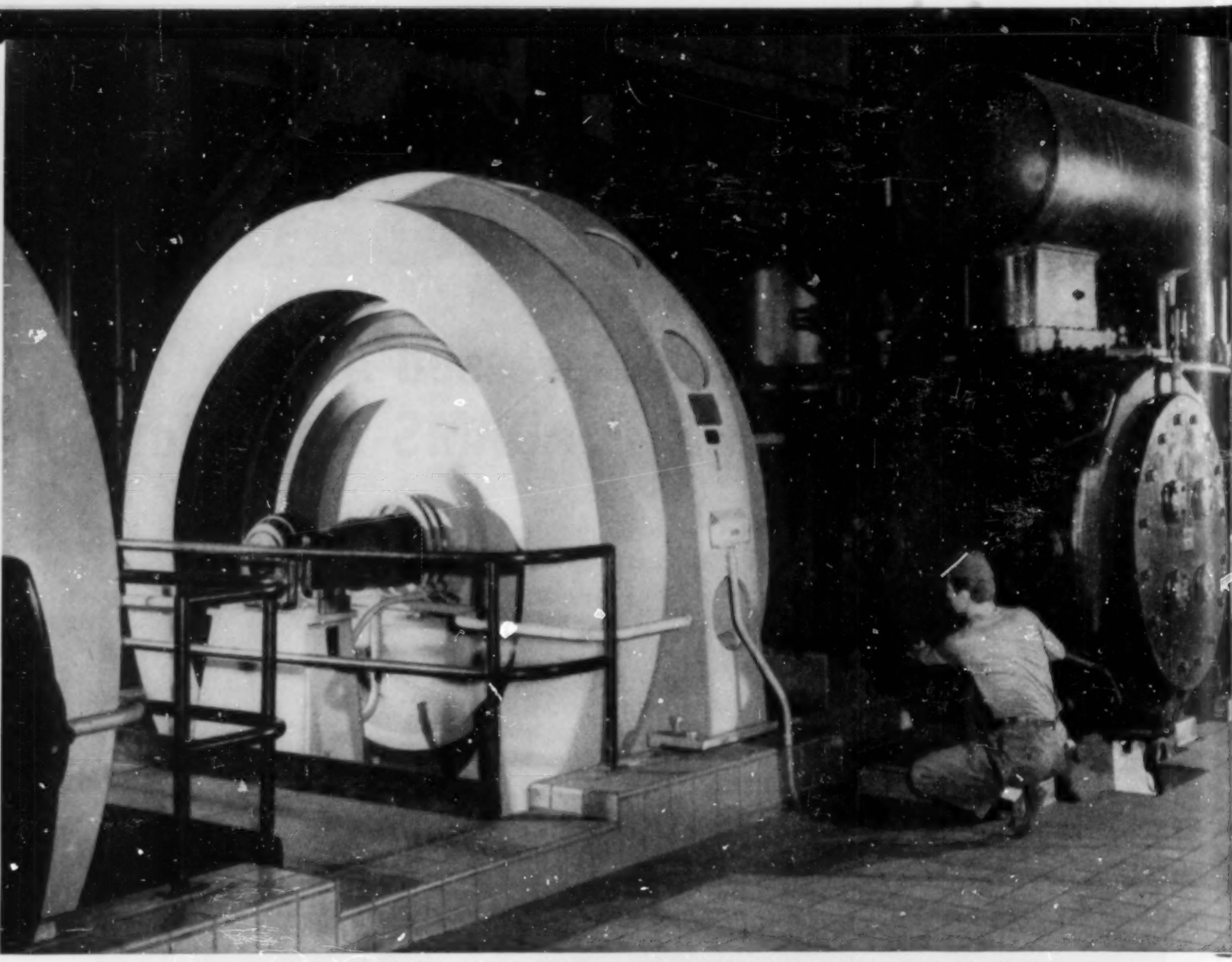
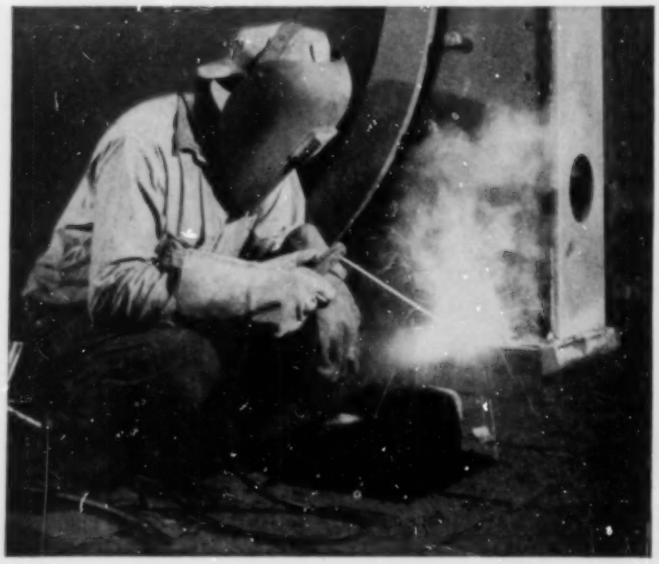


ONE OF FIVE 2000-HP G-E SYNCHRONOUS MOTORS USED FOR AIR-COMPRESSOR DRIVES AT FORD MOTOR CO., ROUGE PLANT.

FOUR REASONS WHY G-E SYNCHRONOUS MOTORS



1. STRONG, FABRICATED FRAMES . . .

The welded steel-plate stator frame provides maximum rigidity in a comparatively lightweight construction. The sturdy channel-shaped frame consists of a wrapper plate firmly secured by continuous welds to rigid side plates. This design, proved by years of operating experience, affords more than ample strength for clamping and supporting the stator core.

2. G-E BRUSHES ON G-E MOTORS . . .

Brushes on G-E synchronous motors are a product of G-E teamwork. Close co-operation between machine designers and laboratory engineers means you get the right brush on the right motor for your particular application. In addition to extensive research and testing, all new and improved grades of brushes are thoroughly field-tested before approved for standard use.

Dependable G-E Synchronous Motors on 24-Hour Assembly-line Service

Ford Motor Company uses G-E synchronous motors for air-compressor drives

Compressor-motor dependability is really put to test on 'round-the-clock service at Ford Motor Company's Rouge plant. Compressed air is used 24 hours a day on many assembly operations, and a dependable supply is vital to keep production lines moving.

To furnish this all-important air, five 2000-hp G-E synchronous motors drive reciprocating compressors continuously—with only slight reductions in demand on certain shifts.

G-E synchronous motors can be relied upon for such continuous service with minimum downtime. You can depend on them because in back of every G-E synchronous motor stand more than half a century of motor engineering leadership . . . superior research and testing facilities to assure excellent component materials . . . and a corps of experienced craftsmen who are proud of the equipment they build—and build it to last.

The next time you consider a drive for heavy, continuous-service equipment be sure to call in your G-E representative to discuss any special application problem you may have. Have him explain the many money-saving uses for G-E synchronous motors and point out their operating economies.

In the meantime, you can obtain more information on G-E synchronous motors by writing for bulletin GEA-5332, "Low-speed Synchronous Motors." Write to Section 770-29, General Electric Co., Schenectady 5, N. Y.

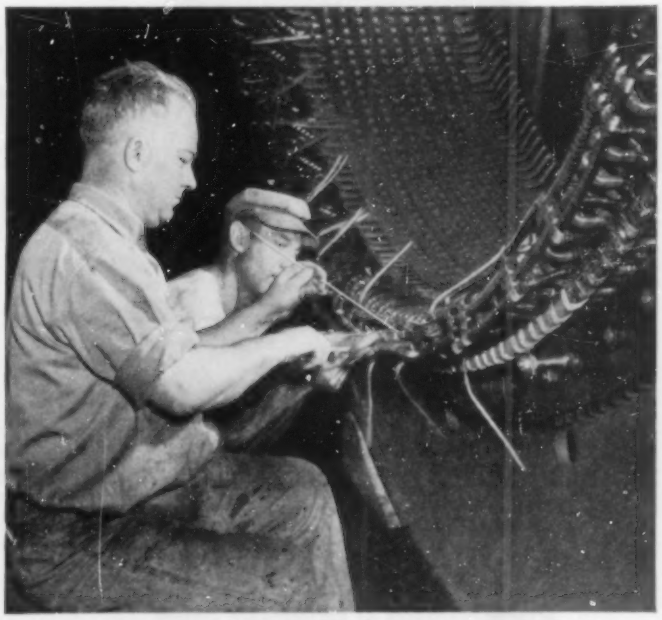
Progress Is Our Most Important Product

GENERAL ELECTRIC

GIVE LONG, DEPENDABLE SERVICE . . .

3. LONG INSULATION LIFE . . .

Insulating materials, manufactured in our own factories by the most modern methods, conform to rigid G-E specifications and are applied by experienced operators, above. Thus coils are uniform, interchangeable, mechanically rugged, and moisture resisting.



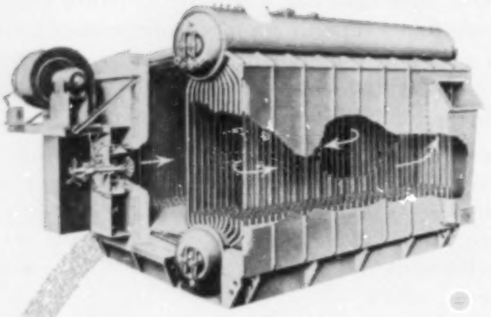
4. LOW-RESISTANCE CONNECTIONS . . .

For dependable operation, stator windings are silver brazed, as shown above. Joints of this type have low electrical resistance, exceptional thermal and mechanical strength. These important properties are difficult to obtain by other methods.

STANDARD BOILERS THAT SET INDUSTRY STANDARDS

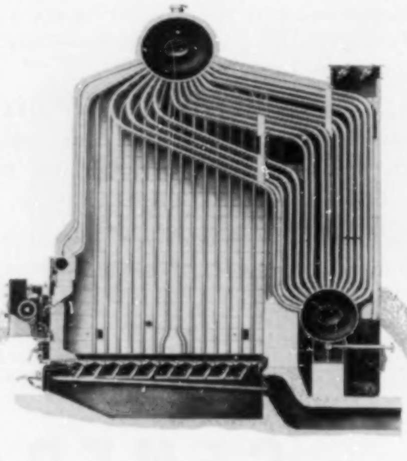
Whatever your steam needs, in the complete C-E line of fuel burning and steam generating equipment, you will find a type and size just right for you.

In the moderate capacity range, for example—from 4,000 to 120,000 pounds of steam per hour—the three *standardized* C-E Boilers shown here offer advantages of economy and performance that make them standout values in a wide range of applications.



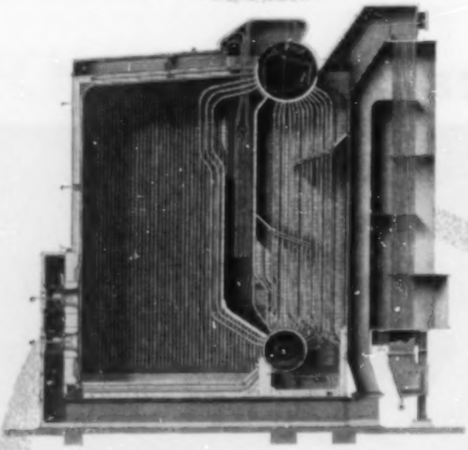
C-E Package Boiler, Type VP

4,000 to 40,000 lb steam per hr . . . pressures to 500 psi . . . for pressure firing of oil or gas . . . completely shop-assembled, needs only simple concrete slab for foundation. Has more water-cooled area per unit of furnace volume than any other boiler of its size and type. Large lower drum permits simple, symmetrical tube arrangement . . . great water storage capacity . . . easy access. Low-speed centrifugal fan is unusually quiet in operation. Simple baffle arrangement means low draft loss . . . simple soot blowing . . . no dead pockets . . . high heat absorption.



C-E Vertical-Unit Boiler, Type VU-10

10,000 to 60,000 lb steam per hr . . . pressures to 475 psi . . . superheat to 200 F in larger sizes . . . for coal, oil or gas . . . bottom-supported, needs no outside supporting steel. Boiler is efficient over a wide range of output, and is easy to operate and maintain. All parts are readily accessible for inspection. Regardless of fuel, the same general cross-sectional arrangement of drums, convection bank and furnace cooling is used. Uniform design through each transverse section assures even water level in drum, and uniform expansion.



C-E Vertical-Unit Boiler, Type VU-55

50,000 to 120,000 lb steam per hr . . . pressures of 250 or 500 psi . . . superheat and heat recovery equipment if desired . . . for oil or gas . . . bottom-supported, needs no outside supporting steel. This boiler is of symmetrical design. Thus gas temperature is constant across the full boiler width. The narrow, high furnace . . . integral design of boiler and preheater . . . absence of exterior ductwork . . . compactness—all help the VU-55 achieve standards of performance closely approaching that of large central station boilers.

Other C-E Industrial Boilers

In addition to the standard boilers shown here, Combustion offers many other 2-drum designs, for capacities to 350,000 pounds of steam per hour, for any commercially available fuel, for pressures to 1375 psi, and temperatures to 960 F. Heat recovery equipment is available. So — whatever your steam needs — call Combustion for details on the complete line of C-E Industrial Boilers.

B-767B

COMBUSTION ENGINEERING

C-E

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS & FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

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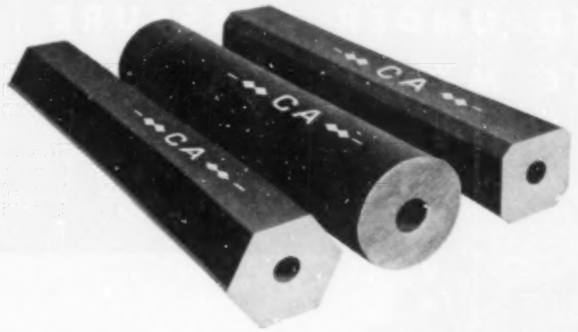
TEAMED FOR DRILLING EFFICIENCY....



Crucible CA Double Diamond Alloy Hollow Drill Rods

Crucible HY-Tuf for tungsten carbide bit bodies

Here's a combination you just can't beat . . . detachable bits of Crucible HY-Tuf® alloy steel with tungsten carbide inserts and Crucible CA Double Diamond® Alloy Hollow Drill Rods . . . the toughest, longest-lasting drill steel made.

HY-Tuf detachable bit bodies are made to withstand the terrific pounding of heavy rock drills . . . pounding which no ordinary steel can possibly take. And Crucible CA Double Diamond Rods give you superior drilling performance with minimum rod breakage and bit losses . . . a *team* that provides the *lowest cost per foot of hole drilled.*

Buy U.S. Savings Bonds

CRUCIBLE first name in special purpose steels

54 *years of Fine steelmaking*

HOLLOW DRILL ROD

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

Circle 32A on reply card

MADISON-KIPP

Fresh Oil

... FED UNDER PRESSURE BY THE MEASURED DROP

the most dependable method of lubrication ever developed!

This lubricator becomes an integral part of a machine tool in which there are 48 vital bearings that require dependable lubrication. The Madison-Kipp mechanism is so compact that the reservoir measurements are only 4" wide, 19¾" long by 5¾ high." There are six different models to meet almost every application requirement. Please write us for all details regarding your particular lubricator requirements.

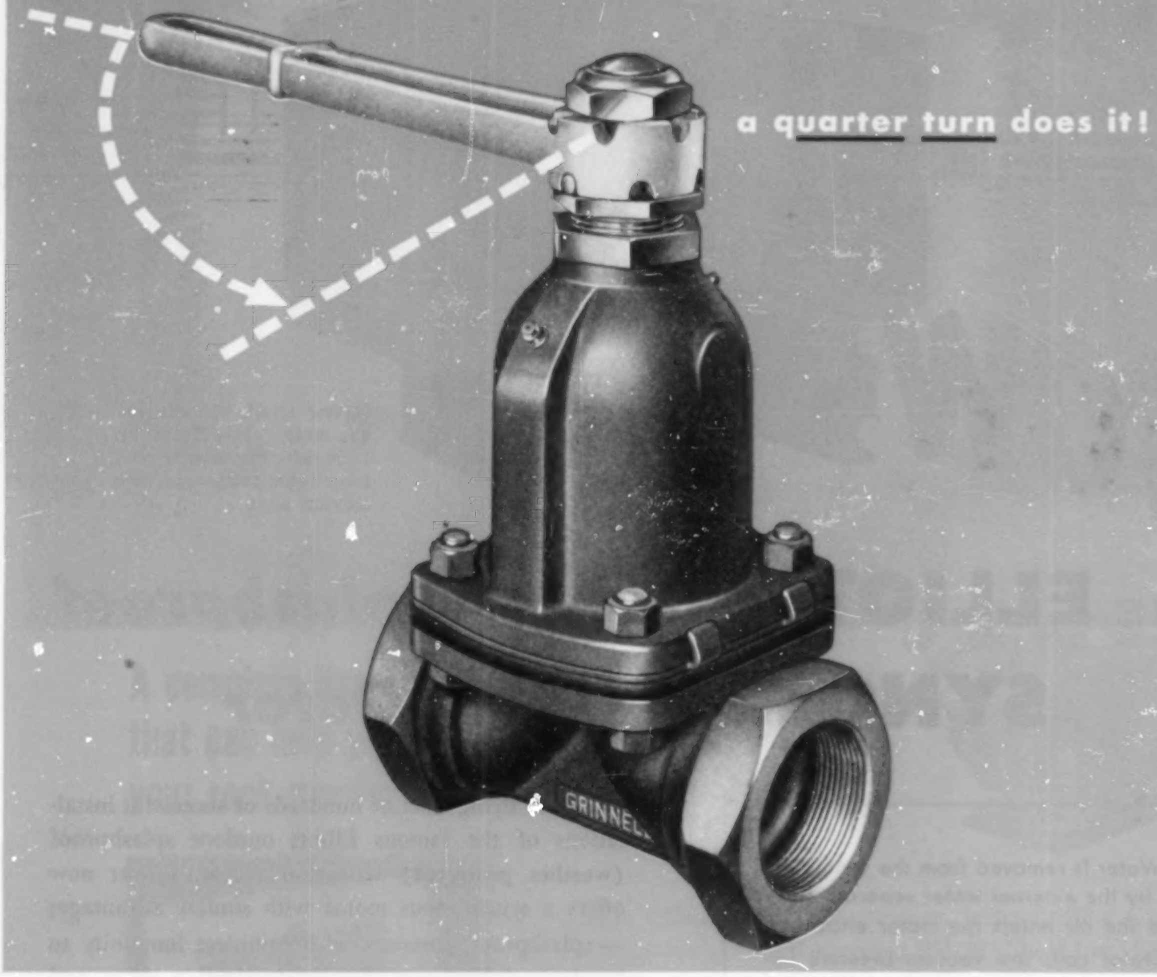
MADISON-KIPP CORPORATION
202 WAUBESA STREET • MADISON 10, WISCONSIN

kipp

- Skilled in Die Casting Mechanics
- Experienced in Lubrication Engineering
- Originators of Really High Speed Air Tools

Circle 33A on reply card

Newest... and Fastest in Compressed Air Control Valves



Only *one quarter turn* of the control lever is needed to close or open the new QUICK-ACTING Grinnell-Saunders Diaphragm Valve. The lever actuates a shaped cam that lowers or raises the valve stem smoothly and with relatively little effort. Easy operation is secured by careful design of the cam surfaces, to apply increasing force as the resistance to closure increases.

In the smaller sizes, this new valve is ideal for air-operated tools, presses, clamps, molds, or wherever fast control is requisite. In the larger sizes it supplies quick control of air agitators, or large headers at compressors where speed may be a factor in safety.

All of the established and outstanding features of Grinnell-Saunders Diaphragm Valves are retained: complete isolation of all working parts, leak-proof closure, a high lift for full streamline flow, freedom from clogging, a choice of diaphragm materials resistant to oil and to most chemicals, body linings to suit the required service, and easy maintenance. Write for full details *today.*

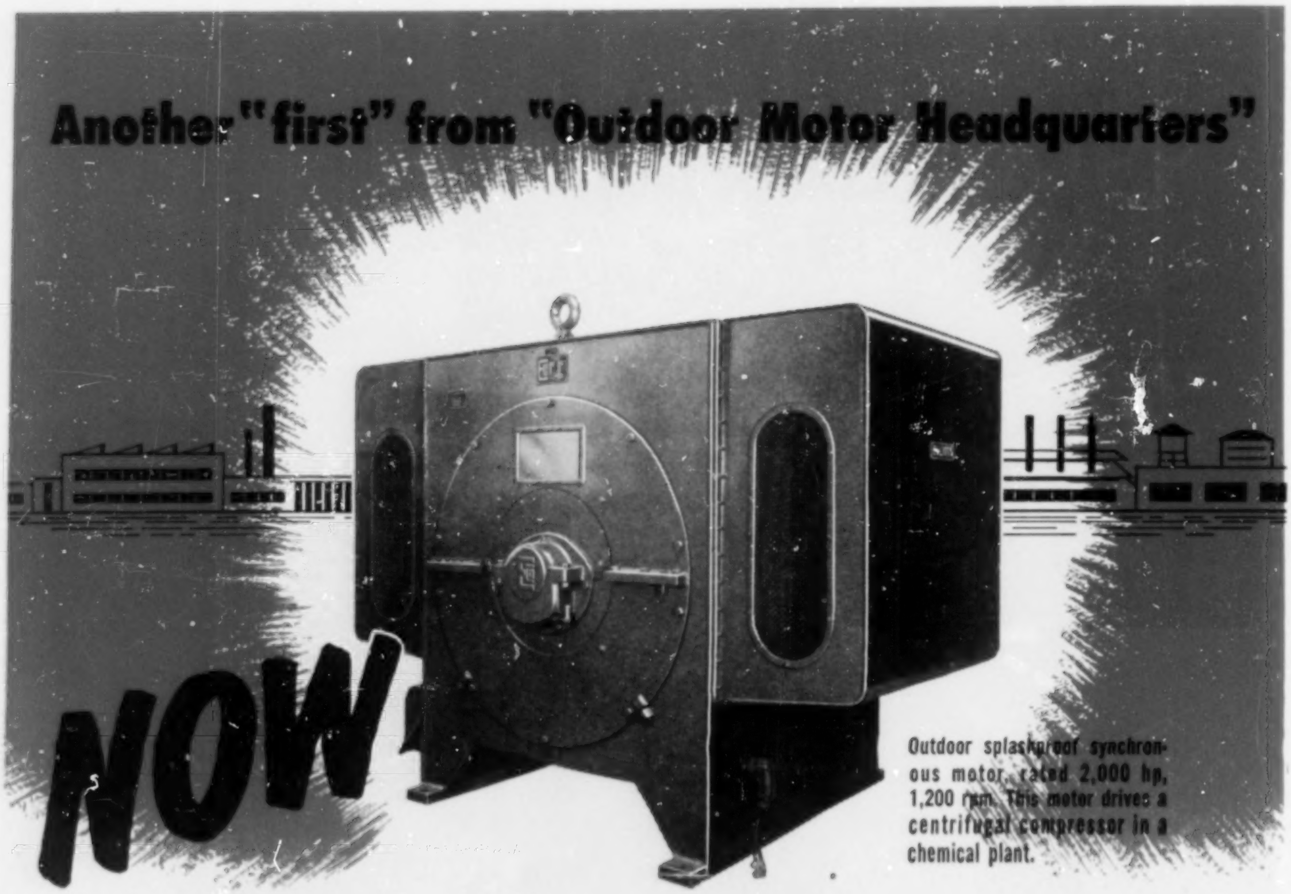
GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

Circle 34A on reply card


Another "first" from "Outdoor Motor Headquarters"
NOW

Outdoor splashproof synchronous motor, rated 2,000 hp, 1,200 rpm. This motor drives a centrifugal compressor in a chemical plant.

The ELLIOTT Outdoor Splashproof SYNCHRONOUS Motor

- Water is removed from the ventilating air by the external water separators before the air enters the motor enclosure.
- Stator coils are vacuum pressure impregnated to withstand the effects of high humidity or moisture.
- The stator is completely immersed in varnish and baked dry after it is completely wound. This provides a rust preventative treatment for the entire inside of the stator as well as additional moisture protection for the stator coils.
- Collector rings are accessible through a removable transparent cover.

With the flying start of hundreds of successful installations of the famous Elliott outdoor splashproof (weather protected) induction motor, Elliott now offers a synchronous motor with similar advantages — splashproof economy with complete immunity to hurricane-driven mist, dust, rain, sleet or snow, and extremes of temperature.

Having passed every test in up to three years of service, Elliott synchronous motors of outdoor type, both vertical and horizontal, are now made available in capacities from 150 hp up. Contact your local Elliott field engineer for details, or write Elliott Company, Ridgway Division, Ridgway, Pa.

Elliott FABRI-STEEL MOTORS AND GENERATORS

ELLIOTT Company

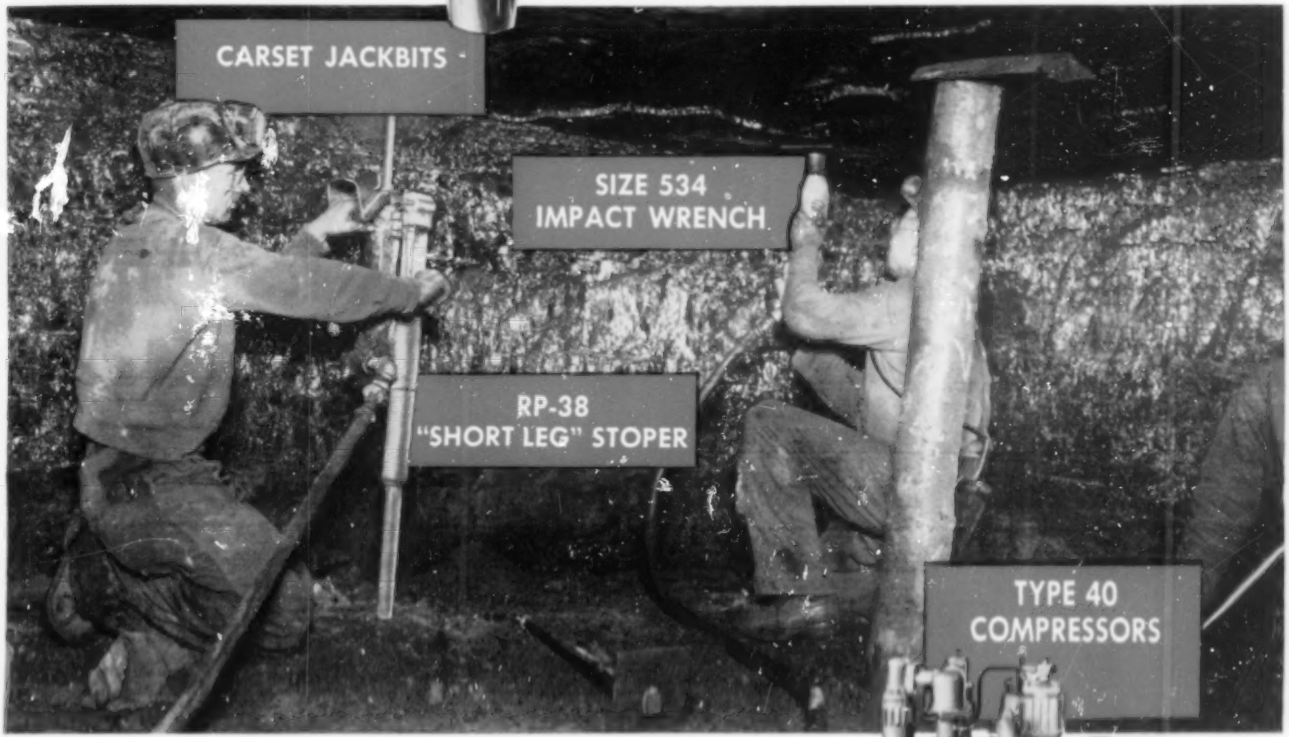
R4-11

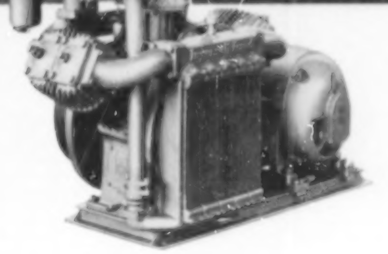
TURBINE-GENERATORS
TURBINES
MOTORS
GENERATORS
DEAERATING HEATERS
EJECTORS
CONDENSERS
COMPRESSORS
TURBOCHARGERS
TUBE CLEANERS
STRAINERS

Circle 35A on reply card

EVERYTHING *for* ROCK BOLTING

from the bit to the compressor





A complete line of coordinated equipment that can help you pin down your rock-pinning costs

the application
of **ROCK BOLTING**
to the roof and sides
of rock excavations

Ingersoll-Rand

FREE—NEW ROCK-BOLTING HANDBOOK

This new 12-page booklet is the most complete and authoritative report thus far produced on rock bolting methods, applications and equipment. Ask your I-R representative for a copy—or write to Ingersoll-Rand for Bulletin 4155.

SAVE TIME with longer-lasting, faster-drilling Carset Jackbits and light-weight, hard-slugging RP-38 "Short Leg" Stopers, (single or telescopic feed leg.)

SAVE EFFORT with easy-handling, Size 534 Impact Wrench that tightens bolts without any kick or twist to the operator.

SAVE EXPENSE with compact, efficient Type 40 air-cooled compressors—electrically driven, easy to install or move from place to place.

SAVE TROUBLE by letting your Ingersoll-Rand representative take full responsibility for your rock bolting requirements.

5-90

Ingersoll-Rand

ROCK DRILLS • COMPRESSORS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL & GAS ENGINES

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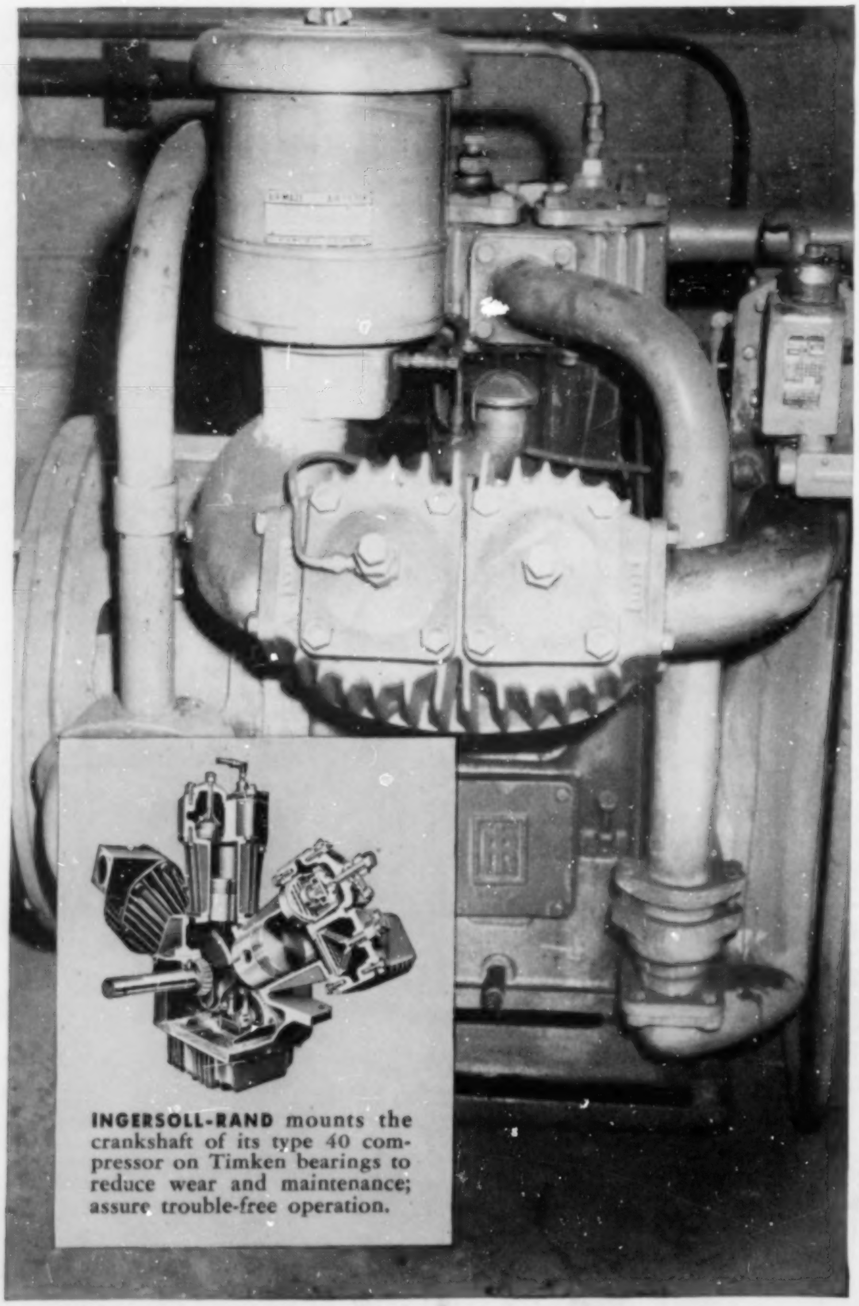
New York cleans up with help of Ingersoll-Rand compressor and TIMKEN® bearings



INGERSOLL-RAND mounts the crankshaft of its type 40 compressor on Timken bearings to reduce wear and maintenance; assure trouble-free operation.

THIS Ingersoll-Rand type 40 compressor powers the air-type grease guns that help keep New York's garbage wagons on the go. And with Timken® tapered roller bearings on the compressor's crankshaft, New York cleans up even more. Wear is reduced, maintenance costs are cut and long life assured.

Timken bearings reduce wear because their true rolling motion and incredibly smooth surface finish practically eliminate friction. And because the tapered construction of Timken bearings enables them to take any combination of radial and thrust loads, the crankshaft is held in positive alignment.

Timken bearings keep housings and shafts concentric—making closures more effective in keeping dirt out, lubricant in. As a result, maintenance costs are held to a minimum.

Timken bearings handle the crankshaft loads with ease. Full line contact between rollers and races gives Timken bearings extra load-carrying capacity.

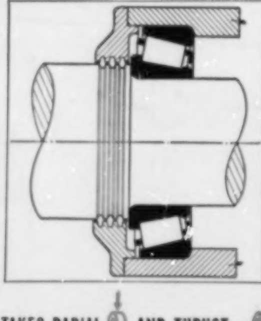
To get all these advantages in the equipment you build or buy, always specify Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



LUBRICANT STAYS IN —DIRT KEPT OUT

Because Timken bearings hold shafts concentric with housings, closures are made more effective. Lubricant is retained, dirt and moisture kept out.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis Timken steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ⊳ BEARING TAKES RADIAL AND THRUST → ← LOADS OR ANY COMBINATION

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